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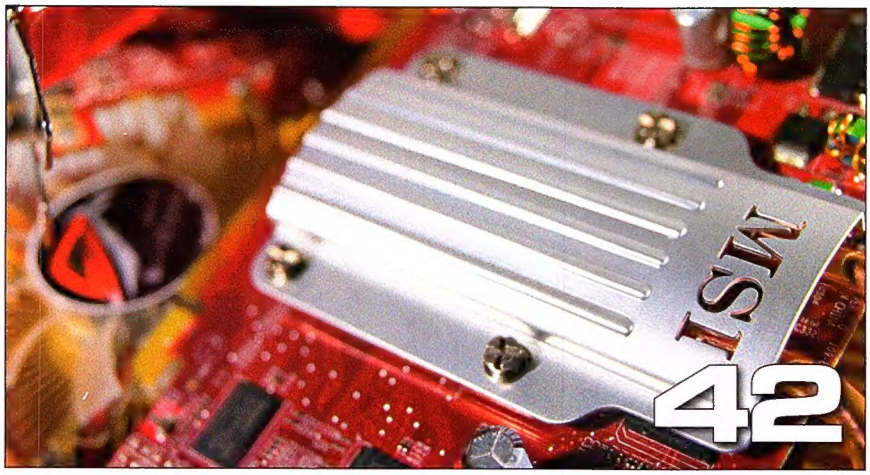

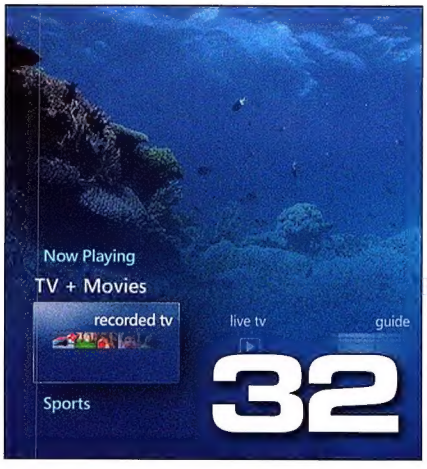

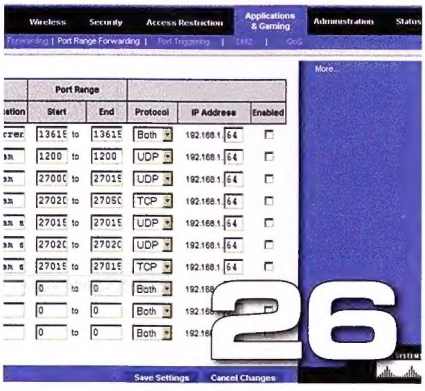

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Strangely, this has absolutely nothing to do with my editorial this month – I just wanted to be clear on my opinion of the great Geena, and that the title of my piece is more of a flavour thing, rather than me secretly expressing my love of her, and on a lesser note, Samuel L. Jackson.

Talking of notes, it's time to pass on a sadder one. *Issue 81* of this marvellous magazine marks my last as editor.

I've called *Atomic* home for close to five years, during which time I've done, learnt and broken a lot of things. When I look back, 58 issues stare at me, and I glance lovingly at them.

My respect for hardware is at its peak, and I doubt I'll be able to look at a BIOS again without searching for a voltage setting of some description.

To me, *Atomic* represents the impossible made possible. It's a place of opportunity, ingenuity and integrity. We should all take pride in the fact that *Atomic* has sustained itself as a beacon for the PC and tech enthusiast for six and a half years, and looks like it'll continue to shine for a long time to come.

I've worked with some utterly fantastic and purely amazing people over the years, people much smarter and wiser than I. John Gillooly, Ashton Mills, Craig Simms and of course, Ben Mansill, the powerhouse of a man that embodies everything *Atomic*. I'm sure for some of you those names will ring a bell, or even one of those giant oriental gongs, like in *Indiana Jones and the Temple of Doom*.

And now, on with this issue.

AMD's budget Radeon range has arrived, touting a new architecture with support for DirectX 10. If you've been holding out on joining the Vista gaming crowd, now might be the time. Josh Collins took a nice batch of cards and put them to work. It all starts on page 42.

A new writer to the fold, Ben Brownlee, put together a tasty network tweaking guide to help you squeeze the fruitiest of performance juice from your OS, NIC and router. The lovely words of this article begin on page 26, which we hope will be joined by the company of your eyes shortly.

Adam Turner completes his HTPC tutorial from page 32, Alex Gambotto-Burke investigates the evolution of gaming audio and Ron Prouse has managed to turn a model car into a network storage device. It's a bumper issue indeed.

Well, that's all from me. To those of you in the know: SMAKIBBFB. To those who aren't: See you on the flip-side… or the same side. One of those.

Kippers.

Logan Booker
lbooker@atomicmpc.com.au

CORRECTION: In *Atomic 79* (August), we ran a promotion for subscriptions, offering four of Seagate's impressive Barracuda 7200.10 500GB drives.

Unfortunately a slip of our art director's texta meant that instead of saying the drives are $299 each, the price was given as $299 total. Apologies to our readers and Seagate – thanks again for the drives!

Issue 79 winners: 5x copies of *Jin-Roh*. D. Pullan, Banora Point NSW; A. Smith, Swan View WA; T. Zajcew, Sandringham VIC; J. Uy, Dutton Park QLD; B. Hansen, Mullumbimby NSW.

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printed by **webstar**

distributed by
network distribution company
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(09) 625 3005

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Atomic: *Maximum Power Computing is published monthly by Haymarket Media. Company registered in Australia (ABN 61 083 063 914). This publication may not be reproduced or transmitted in any form in whole or in part without the written permission of the publisher.*

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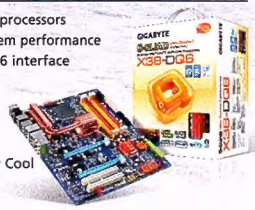

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TECHTRENDS

Quenching your thirst for the latest technology and hardware happenings

Z9s or D9s, what the heck are they?

Josh Collins looks into the realm of the Micron D9 legend and its progression into DDR3 memory.

No doubt throughout the DDR2 era you've all read a reference to Micron D9s. This classy group of memory ICs is capable of reaching considerably higher frequencies and/or low latencies then its competition from other IC manufacturers. such as Elpida, ProMOS, Hynix, Samsung and Infineon (now known as Qimonda).

Micron has been the commanding force within the high performance territory of DDR2 due to the stellar performance offered in the early days by the now legendary 'fat body D9s'.

These ICs were soon replaced with a smaller 80nm IC. The standout performers from this refresh also soon came into legendary status also.

Micron D9-based ICs have been used almost exclusively for performance memory modules. The highest performance kits out there from the Corsair Dominator PC2-10000 C5, Patriot EL PC2-9600 C5 to the OCZ FlexXLC PC2-9200 C5, down to the low-latency range of the Crucial Ballistix PC2-6400 C4 and TEAM Xtreem PC2-6400 C3.

D9 kits in general offer a much higher overclocking ceiling compared to their competition and scale considerably when fed extra voltage – hence their success in overclocking circles.

Now moving into the DDR3 era, Micron has taken its time to release its DDR3 based products to the market, giving the likes of Elpida and Qimonda some time in the limelight, as performance ICs with kits such as the Elpida-based Kingston HyperX rated at DDR3-1375 C7 and the Corsair XMS3 DDR3-1333 C9 (overclocks to DDR3-1600 C9).

Now, some months after the initial public release and availability of DDR3 modules, Micron has opened the gates of hell and unleashed the chain holding back its Cerberus on the DDR3 world.

The first blow by Micron was in the form of modules based on an IC with the markings Z9HWQ. Many enthusiasts jumped on the bandwagon naming the new DDR3 ICs from Micron as Z9s. This however was incorrect, as this was relating to the engineering samples (ES).

As such, Micron carried on with a D9 based naming convention for its retail sample DDR3 range, with the Z9 naming convention reserved for not-for-sale engineering samples. The majority of currently available performance DDR3 is based on these new Micron D9 ICs, such as the TEAM Xtreem DDR3-1600 C7 (reviewed on page 51), are using the D9GTR IC, previously known as Z9HWQ.

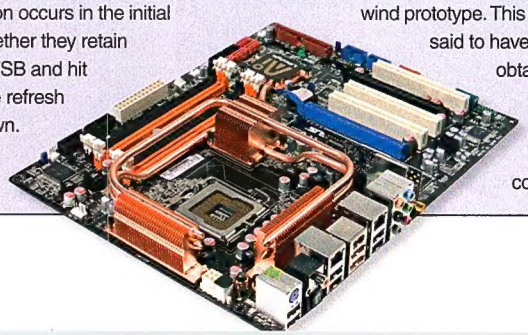
With the initial results of these new ICs from Micron pushing 1000MHz (2GHz effective), the future of DDR3 is looking exceptionally attractive!

Micron 1GB DRAM, 128MB x 8, 78nm, MT41J128M8BY FBGA codes for engineering (ES) and commercial samples (CS)

Speed grade	Engineering sample DRAM	Commercial sample DRAM
-25E 800 5-5-5	Z9HWW	D9GTP
-25 800 6-6-6	Z9HWV	D9GTN
-187E 1066 7-7-7	Z9HWQ	D9GTR
-187 1066 8-8-8	Z9HWT	D9GTQ
-15F 1333 8-8-8	Z9HWS	D9GTT
-15E 1333 9-9-9	Z9HWR	D9GTS
-15 1333 10-10-10	Z9HZM	D9GZL

SHORT CIRCUITS

With rumours abound this month, as with every month, this time it is speculation around Intel's upcoming 45nm based Penryn, Wolfdale and Yorkfield processors. Word is that these processors are likely to run at a 400MHz FSB. Whether this progression occurs in the initial release or whether they retain the 333MHz FSB and hit 400MHz in the refresh is not yet known. So keep an eye out.



They're at it again, further developing the use of Ionic winds as a computer cooling solution. According to the Purdue University, West Lafayette, Indiana, a team of scientists assigned to the project have produced, with the funding help of Intel, a chip-sized ionic wind prototype. This prototype is said to have the ability to obtain a 250% improvement in heat transfer coefficient.

In recent times there has been an increase in the number of people using the functionality and potentially increased security benefits of virtual machines and virtualisation in general. Jumping onto this trend, as with most trends these days, Dell has announced plans to release a range of systems to cater for this growing market. Not only that, it has partnered with the likes of VMware and SWsoft to build system providing these virtualisation technologies for the general consumer. VMs for the masses... who'd have thunk it?

Atomic, Team Australia and GIGABYTE at the WCG

Josh Collins reports on the overclocking madness!

At the recent World Cyber Games (WCG) finals hosted in the Big Top at Sydney's Luna Park, an extreme cooling and overclocking demonstration and exhibition took place over the two days of the finals competition.

Utilising the cooling potential of dry ice (minus 65 to minus 75 degrees Celsius), single stage phase change cooling (minus 35 to minus 45 degrees Celsius) and the grandfather of consistent cooling solutions: Kayl Hosken's custom hand-built Frozen Cascade phase change cooling device capable of temperatures below minus 100 degrees Celsius. Three members of Team Australia, Kayl Hosken, Dino Strkljevic and *Atomic*'s own Josh Collins, put on an exhibition of the true potential of today's computing technology.

With the help of not only some extreme sub-zero cooling, but also the helpful hints given by the wonderful WCG 'girls in blue', the team was able to reach a multitude of stellar results. These results included a sub-10 second Super Pi 1M time, multiple high 4GHz+ overclocks as well as a mind boggling 5.4GHz overclock from a 2.66GHz Intel Core 2!

Be sure to take the opportunity at Atomic Live '07 to check out an even more intense and insane overclocking and cooling exhibition!

Australian overclocking surging forward

Josh Collins congratulates Tim Marshal yet again

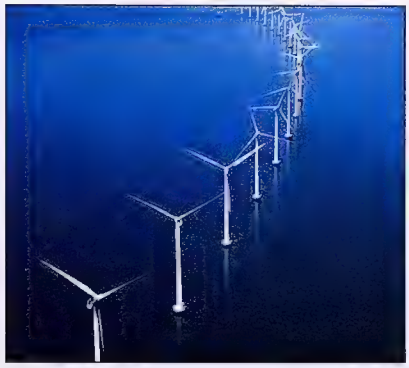
With another ASUS overclocking competition having taken place, this time in Indonesia, and yet another strong performance by Team Australia's very own Tim 'T_M' Marshal.

Traveling from Singapore, then to Indonesia, to compete in the event, T_M found himself, yet again, up against some of the best overclockers from throughout the Asia region. Not discouraged, the lad from Adelaide put his head down and focused on the comp.

Following up his success at the Singapore overclocking competition, he roped in a 2nd place position for day 1 on the DDR2-based system, losing to first place winners by just 1fps in the 3DMark06 Q3 score.

Looking onwards to the second day of competition, once again Tim fought valiantly against the rest of the competition. Dealing with a handicap due to an overclocking wall on his processor, maxing out at 4.4GHz while competitors were hitting 4.65GHz, the Australian representative team still managed to tie for first place, only to be edged out in the decider Super Pi benchmark due to the lower CPU frequency.

With two top efforts so far, let's hope the good runs continue and congratulations from the lads at *Atomic*.



Recently we saw the birthday of the humble compact disc come and go. Back in 1982, in a factory somewhere in Hanover, Germany, the first compact disks were produced. An engineering marvel and a wonder for all to see, a palm-sized disc with a rainbow sheen that for years to come would be instantly recognisable as the storage medium of choice for many purposes.

We hold our glasses high to our humble circular friend and ponder as to what storage mediums the future may hold for us. Holograms? Scott Bakula? Who knows.

FUTUREPROOF

Gazing into the crystal ball of tech

Hot but not

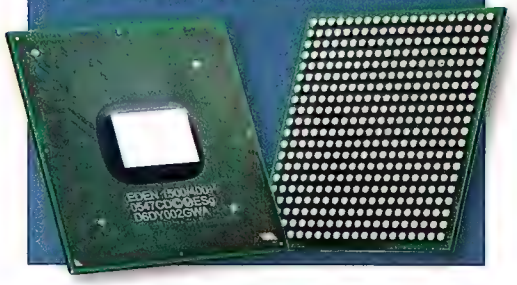
Running with a strategy of 'small is beautiful', VIA has taken it one step further by not only creating small x86-based computing systems but now it also specialises in cool running CPUs.

Not just cool, but freakin' ridiculously cool! Having just released a new addition to the VIA Eden ultra low voltage (ULV) processor family, this new addition boasts a frequency of 500MHz at an astounding idle power of just 1W.

Designed from the ground up to meet strict low power requirements, the VIA Eden family processor is now well placed within the market to take on a wide range of industrial, commercial and ultra mobile applications.

This has a potentially massive impact across a number of markets. With the processing power of x86 now available within much smaller and restrictive enclosures as well as being easier to program for than other low power processors, this could see the dawn of sizeable performance increase in the likes of routers, mobile devices and other such electronic equipment.

A huge achievement and advancement set to lead a future of innovative products.



POST OF THE MONTH

The sun's shining on the forums. It's a bounty of great posts from great people. Some regulars that can always be counted on for the good stuff, and some special gems from less frequent superstars. Cheers to all who help keep track of the good stuff, especially the wondermods. There can only be one this month. It's the monsterkill of threads, it's the mighty:

Chaos' Atomicville Werewolves and Villagers – The GAME **www.atomicmpc.com.au/forums.asp?s=1&c=1&t=112065**

Unbelievable. Chaos' game is total win. So much fun, so cleverly crafted. She's in character beautifully, and the love for it all by so many Atomicans has made sure it's great.

It's an amazing read even if you're not playing, some of the analysis is jaw dropping! Yet another way that Chaos is glue that bonds us and keeps us entertained.

Thanks Chaos, you're a golden treasure, you are. Logitech G5 lovin' heading your way!

Every **Post of the Month** *wins a fabulous* **Logitech** *mouse from the brilliant people from* **Logitech**. *Huzzah!!!*

Far Cry 2 has about a zillionth the number of trees as were in the great original – but of what mighty trees! They do so much more!

Scanner special: Far Cry 2

Ubisoft takes us to Africa in the upcoming Far Cry sequel. David Kidd peeks behind the curtain.

Far Cry 2 doesn't have much to do with CryTek's original masterpiece. That's partly because CryTek has nothing to do with it, having handed over the name and rights to Ubisoft, and partly because CryTek's upcoming Crysis is swallowing up column inches in the gaming press.

But just because Far Cry 2 is slipping under the radar isn't to say that the guys and girls at Ubisoft Montreal aren't creating something worthy of our attention. In fact, it may even beat CryTek at its own game.

The best way to describe Far Cry 2 is to highlight what's been dropped from the original: Jack Carver's gone, the idyllic island paradise is out, the linear mission structure has been abandoned, and CryTek's powerhouse CryENGINE has been extensively modified, so much that it's almost a whole new engine. Patrick Redding, narrative designer on Far Cry 2, describes a darker, grittier contrast to Far Cry's luscious, fantastical backdrop.

'The player starts the game having already been dispatched to a failed state somewhere in

Now this is proper burning. The flames spread out and engulf the whole tree, and grass around it, complete with smoke and heat haze.

Leaving only a charred and smouldering thing with embers glowing on the ground. Magnificent!

Africa, assigned to track down and eliminate an infamous arms dealer,' says Redding.

'The country is in a state of lawless anarchy, with all the power in the hands of two warlords and their armed militia, backed by foreign mercenaries. In order to track down his target, the player is forced to make deals and take on jobs for these warlords that are too dirty for their own soldiers.'

Not only is Jack Carver out of the picture, but Ubisoft has taken the opportunity to avoid a single protagonist altogether. Far Cry 2 seems similar in spirit to the team-based mercenaries in Jagged Alliance.

'[The player] instead selects his avatar from nine possible characters, the remainder of whom appear later throughout the game as the player's buddies,' adds Redding.

Similarly, the non-linear gameplay resembles the open RPG-like worlds of Stalker or GTA, rather than the plot-driven structure of the original. According to Redding, the player can change the course of the story and alter their standing with the game's various factions through a range of mission types.

'The open-world structure supports a variety of exploration missions and side-quests, each of which rewards the player with valuable resources that significantly enhance his chances of survival.'

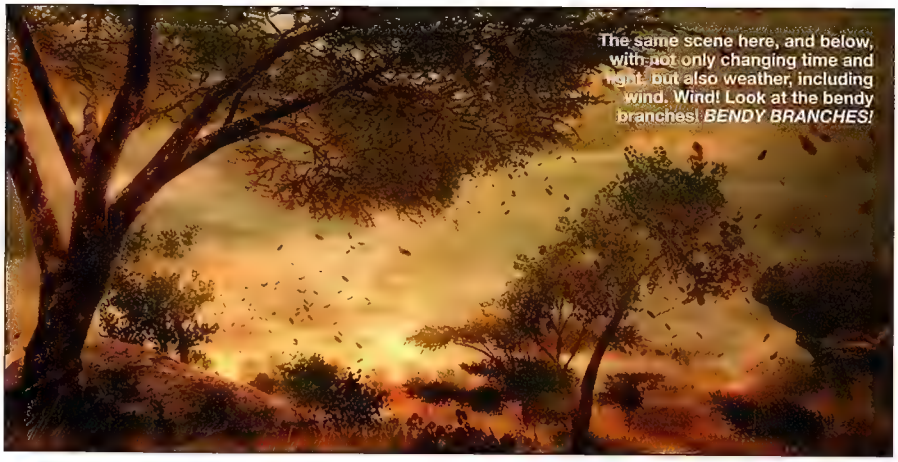
Like the upcoming Crysis, clever use of the environment will play a large role in completing missions. For example, the player could observe the direction of the wind and use a flamethrower to start a bushfire that spreads to the enemy camp, setting all combustible objects on fire. For a game to offer such complexity, however, it needs a suitably next-generation engine like Ubisoft's new Dunia technology (expect to see an Engine Room on it real soon).

'Dunia is based on CryENGINE, but constitutes at least 90 percent new technology, allowing it to offer your standard bag of DirectX 9 and 10 effects, as well as managing procedurally generated environments.

'Our engine supports a lot of new features that make the environment, characters, AI, and animation realistic and believable. We were able to create a fully open world of 50km^2, with dynamic and destructible vegetation. Our engine also allows us to have a 24-hour day-night cycle (with a fully dynamic lighting system).

'We have a procedural sky rendering system that allows us to manipulate the weather according to our wish and the sky adapts. We have new fire technology with a realistic propagation system, so basically everything that looks like it can burn, will,' says Redding.

Far Cry 2 is due for release in 2008 on PC only, but you can find more info on Dunia and follow its progress at the official blog site: **blog.ubi.com/farcry2**.



The same scene here, and below, with not only changing time and light, but also weather, including wind. Wind! Look at the bendy branches! *BENDY BRANCHES!*

No wind here. This is the South Africa we expect. Note the absence of giraffes , elephants and rhinos. And Zulus.

We think this shot is to illustrate how a burning village provides hot air updraft for passing hang-gliders.

atomic LIVE2007

What:

The greatest games and tech carnival in the history of everything

When:

Saturday October 20th 10:00am – 6:30PM

Where:

Badgery Pavilion Sydney Showgrounds

Why:

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What do I do at Live?

We've busted a gut to make sure there's always something going on at Live., in fact, if you choose to spend the whole day at the event we're sure you'll have a grand time.

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- Meet the people behind the tech and games industry

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All day long on the main Atomic Stage there'll be action. We've hauled in the top people that we know you'll want to hear from. Hear presentations from the likes of Intel and ASUS, Kingston and other hardcore PC guys. We've got Bond Uni up there talking about how to get into the tech and games industry and loads more.

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Atomic Live is as active or passive as you want it to be. And by active, we mean force feeding you fun that you'll remember for the rest of your life.

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atomic LIVE 2007

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Witness tourney gaming as entertainment! The Grand Final of the World GamesMaster Tournament is on at Live. We have a spectacular arena decked out like you won't believe. All day long the finalists will be dueling it out, we've got it all on the big screen and you can lounge on our comfy chairs and kick back watching the action and soaking up the excitement.

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Through the day Josh and Kayl will be going at it in the Atomic overclocking booth. We promise you've never seen overclocking like this before! The boys will be explaining the superhardcore overclocking techniques, so hang around with the guys and you'll learn the inner art of getting even more from your own system. Thanks to our sponsors GIGABYTE TECHNOLOGY

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Atomic merchandise

After years of demand, Atomic merchandise makes its triumphant return! Deck yourself out with Atomic gear and be at one with your inner Atomicness.

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Everyone's invited to unwind after the event just around the corner at The Brewery at the Novotel. We've booked out the venue so we can all gather together and talk about what a grand day it was. Note you'll have to be over 18 as it's a licensed venue and you can't buy your beers unless you're a grownup!

Register at: **www.atomicmpc.com.au/atomiclive07reg.asp** - and we'll see you there!

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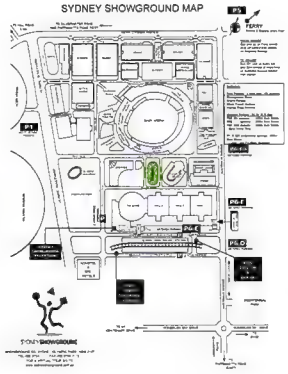
At the fabulous Sydney Showgrounds, in the Badgery Pavilion.

How do I get there?

Sydney Showground is located only 30 minutes from the CBD and 10 minutes from Parramatta. Getting there is easy, with a train station at the door, a bus service from all areas of Sydney, ferries from the CBD and Parramatta, and parking for 10,000 cars

SYDNEY SHOWGROUND MAP



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ATOMICCHAT

Talking to the finest human beings on earth...

Dr Mahesh Prakash

CSIRO has been boiling realistic water for games and movies in its giant think pot. Senior research scientist Dr Prakash talks of the results of this four-year project.

atomic Firstly, could you please introduce yourself to our readers talk about a few of your previous projects?

Dr Mahesh Prakash I am Dr Mahesh Prakash and work as a senior research scientist at the division of mathematical and information sciences in CSIRO. I have worked on several projects involving the application of a novel fluid dynamic modelling technique called Smoothed Particle Hydrodynamics (SPH) to areas such as metal flow modeling (casting), geophysical flows, bio-fluid flows and special effects for animation.

atomic Could you describe what exactly you have achieved with your research? What has been involved over the four years of the project to get to the point you are at today?

Dr Mahesh Prakash We have been developing fluid simulation software that can be used to animate several fluid effects with advanced features such as foam, spray and generation of bubbles. The project involves: Development and implementation of new physics into our base fluid simulation package; tuning the simulation parameters and applying them to situations that are difficult to animate such as the beer simulation and; software development to make the product user-friendly.

This is the third year of the four year-long project and we are now moving towards concentrating more of our efforts in software development.

atomic How complex is the mathematics involved with fluid dynamics? How does it compare to say, the simulation of cloth blowing in the wind or glass breaking?

Dr Mahesh Prakash Simulation of fluid dynamics has always been very complex due to the requirement of needing to solve partial differential equations simultaneously. This has resulted in such simulations taking longer to run as well as being quite non-robust. Added to this complexity is the additional requirement of being able to automatically simulate secondary effects such as foam, spray and bubbles. This makes realistic simulation of fluids quite a challenge.

atomic What would you say is the most demanding type of physics to simulate visually?

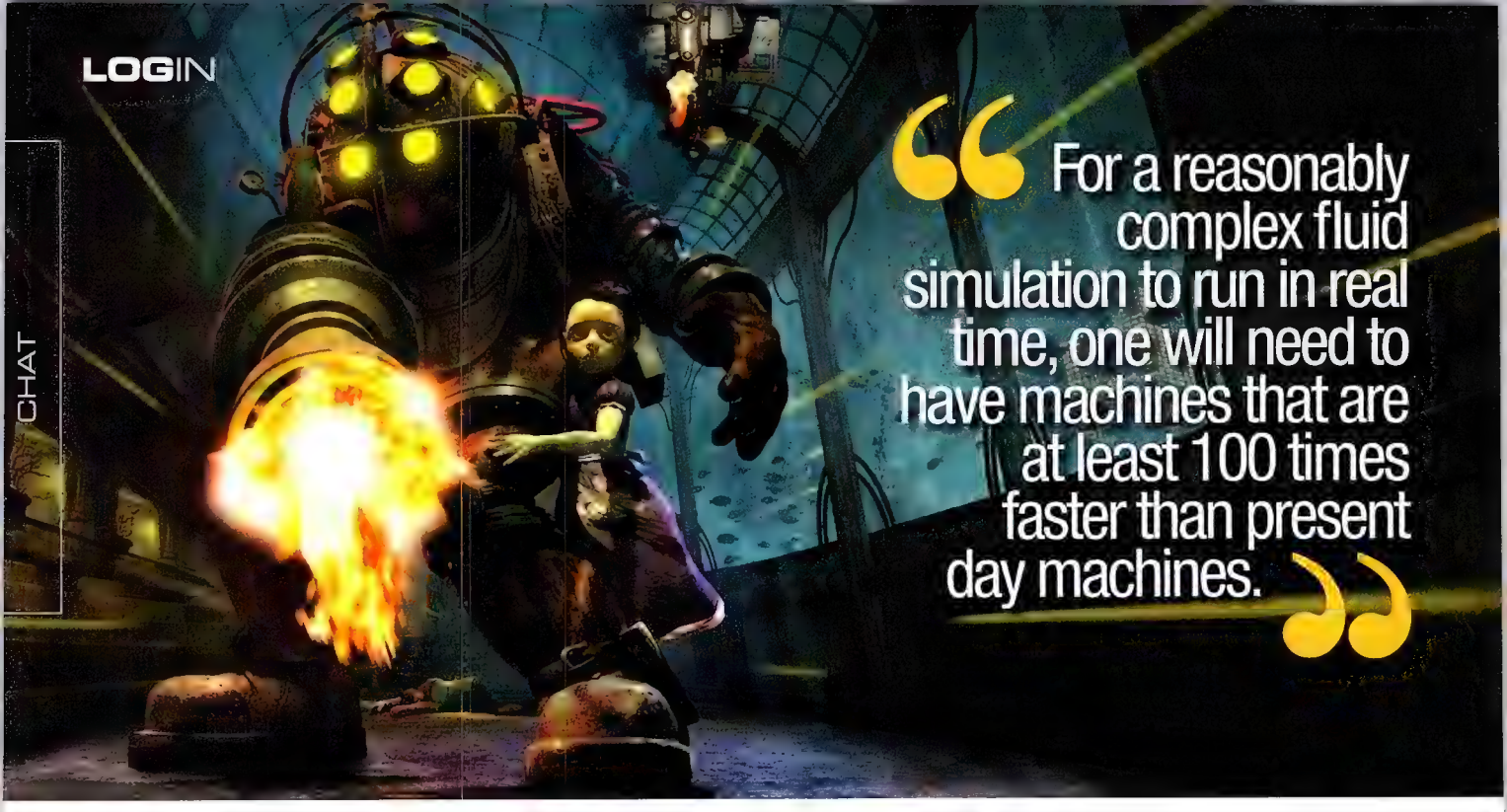
Dr Mahesh Prakash I guess since I am dealing with fluids and its frustrations (I mean in terms of being able to simulate it realistically) I would have thought that this is pretty much the Holy Grail. This is especially true if one wants to combine this with motions of a large number of objects (100 or even 1000+) interacting with the fluid.

atomic How hard is it to create realistic fluid dynamics in movies today? How will your research affect this?

Dr Mahesh Prakash Bringing about realism in fluid dynamics movies today is still quite a challenge. If one has vast resources and money one can do a good job. This can be seen in some of the latest blockbuster movies. What we are trying to achieve is to bring down the cost associated with making such animations so that it can be used by a larger market. This is mainly being done by trying to use accurate physics to represent all the secondary effects in fluid flow. This will result in the entire solution becoming automatic with little or no human intervention for including effects such as foam, spray and bubbles.

atomic How familiar are you with computer graphics in video games? Do you believe you work could aid in the creation of more realistic water effects in video games?

Dr Mahesh Prakash I suppose since we are trying to bring down the cost of animating fluids this should have some benefits to the games development community. Having said that, I believe we still have some way to go before we can expect to see realistic water effects in complex video games since the solution has to be generated in real-time for such scenarios. One possibility is to include several (I mean a huge number of) realistic pre-calculated scenarios for a particular game. However this approach will be a bit tricky to



implement especially considering the fact that the games of today have very complex logic behind them.

atomic How much processing power do you believe would be required to create realistic fluids in real-time? Do you think this sort of technology might be available to consumers within a five or ten-year time frame?
Dr Mahesh Prakash Using the fastest chips around today I suppose one could do a real-time simulation of fluids for very simple scenarios. The scale of the geometry will determine the degree of realism. I cannot guess how fast machines might be in comparison with what we have today in the next five to ten years. I would have thought that for a reasonably complex fluid simulation to run in real-time one will need to have machines that are at least 100 times faster than the present day machines. This will be the minimum requirement as far as I am concerned.

atomic What do you know of consumer 3D accelerator cards and pixel/vertex shader programs? If you are aware of such technologies, what is your opinion on their complexity/power?
Dr Mahesh Prakash I suppose these are related to improving the graphics performance rather than the number crunching issues that we have mainly been trying to address. These will probably have an effect on the render performance but I don't think will have any influence on the fluid simulation.

atomic What developments in hardware and software have made your research possible? What would you say has been the most important development?
Dr Mahesh Prakash The most important part of our development is related to software. The uniqueness of our SPH algorithm coupled with discrete modelling of secondary features such as foam, spray and bubbles allows our code to run more efficiently in any given machine. Our group in CSIRO specialises in developing and applying what we call particle-based or mesh-less methods to several classes of fluid, semi-solid and solid motion problems.

atomic What are your thoughts on General Purpose GPU? That is, the processing of general purpose instructions on graphics processors? Do you feel GPUs will be used in the future to replace CPUs for the tasks of database searches and other highly-parallel processing tasks?
Dr Mahesh Prakash I have seen some papers on this for astrophysical applications. There are some instances where people have reported performance gains using GPUs but I don't think it is true as a general rule. I have found that the performance gains are problem-dependent.

atomic What is the future for your research? How much is left to do and what to you think will be possible in the film/gaming space in the next few years?
Dr Mahesh Prakash As I mentioned earlier we are now in our third year of a four-year project. We are concentrating most of our effort now to make the software more user-friendly and have started beta testing the same with some production houses based in Australia and Korea. In parallel we are including additional complex physics into the simulation engine to include more effects that will involve several phases (solid, liquid and gas) interacting with each other.

Accurately simulated beer bubbles is one of fluid physics' holy grails. We're not kidding. We wouldn't want our CSIRO tax dollars spent any other way.

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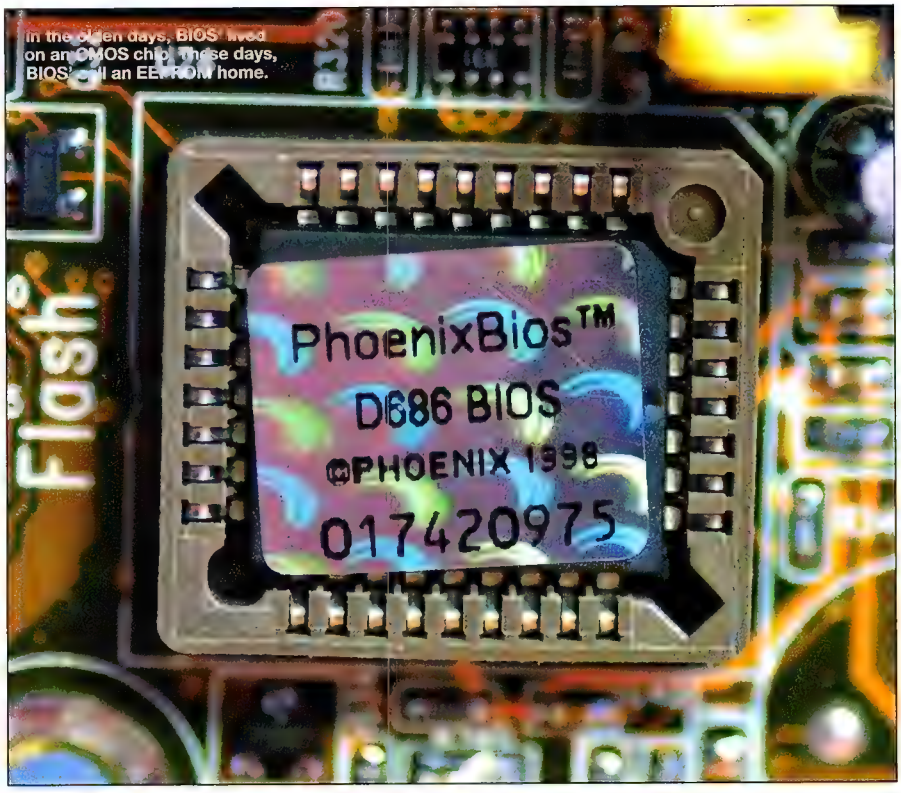


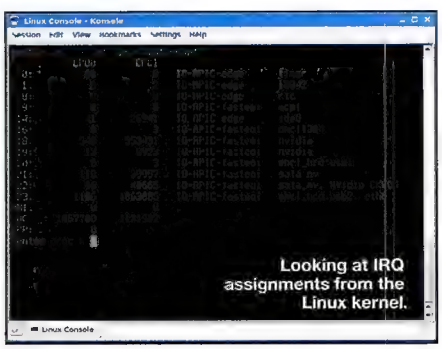
The system BIOS

At the heart of every system lies an old, but vital component – the humble BIOS. **Ashton Mills** takes a closer look.

If the CPU is the brain of your system, then the BIOS is the amygdala – the primitive, legacy, yet still essential core of your system. For as long as we've had our PCs we've had a BIOS, but just what's it good for and why do we still need it?

The inner BIOS

Directly, the BIOS (Basic Input Output System) is a flash ROM that contains software to kick-start your system. This includes initialising memory, video, processor, clock generator, system chipsets, PCI devices and hard drives. Overall, this is known as the POST (Power On Self Test). It also provides a basic means to interface with components like the keyboard and screen, and performs a number of other critical functions – configuration, resource allocation, interrupt handling, and the boot sequence.



Configuration is something we've all come to know and love about our system's BIOS. Any half-decent motherboard will allow you to tweak voltages, clock rates, timings and multipliers, but it hasn't always been this way. It wasn't until enthusiast computing became mainstream that these options were even made available to the general public, and many OEM systems (such as those from Dell or HP for example) completely hide or don't include code to tweak many of the options we know from enthusiast boards.

Resource allocation is the BIOS assigning resources like interrupts (IRQs, Interrupt Requests) to the various components of your system. Traditionally, there are four interrupt lines that onboard and PCI devices share. This is why, despite being in different slots, some cards can be found to share an interrupt.

Usually, this isn't a bad thing except for some devices like sound cards, and here using a motherboard manual to determine which slots use which interrupt lines can help ensure sound cards get a dedicated IRQ.

Additionally, IRQs are allocated to more than just your video card, sound card or SATA controller. The system clock, keyboard, USB and other devices all need an IRQ as well. Today, although the BIOS still assigns IRQs (if only to get the system to a ready state) operating systems like Windows and Linux have the ability to re-assign IRQs for most devices, which can be especially important for devices that require drivers to properly operate from boot up.

Interrupt handling is the act of responding to hardware events, such as a key press or packets coming from a network card. Interrupts allow hardware to alert the CPU that they need attention. When this happens the CPU can pause what it's doing and attend to the device before resuming its operation. Interrupts are vital to the operation of all hardware, and allow the CPU to continue working while devices perform their functions, without waiting for them to finish.

Finally, the **boot sequence** is of course the hard-coded system initialisation that happens every time you turn the machine on and usually starts with a POST and ends with the CPU seeking to load the boot sector of the primary drive into memory and the BIOS handing over control to it. For hard drives, the MBR (Main Boot Record) is loaded and this can point to boot sectors residing on any number of partitions. Naturally, this then kicks in to boot your chosen operating system. Without a BIOS and a boot sector, a machine will be unbootable. The boot sequence also initialises other BIOS' in the system – primarily the video BIOS, but also of any pluggable or onboard storage cards. Any errors encountered are usually communicated via beep codes as, in some cases, the errors might be preventing video display itself.

Modding and flashing

Of course, where would BIOS' be without modding and flashing? For the hardcore, flashing is common to allow new features or compatibility to be added to a system. It has some risks, though rare, as power failures or flashing the wrong BIOS could render a system dead. This is, of course, the impetus for GIGABYTE's Dual BIOS feature that automatically boots the backup BIOS if the first one fails to respond. But how can a dead BIOS be detected if the BIOS itself is dead? Even flashable BIOS' have a *boot block* that runs first and is used to run a checksum on the rest of the BIOS. It's the boot block that runs the very basic code of searching for a replacement BIOS on floppies when it detects a corrupted BIOS.

Modding BIOS' is a little bit trickier, but can be handy for piecing together components like new onboard RAID BIOS' paired with the system's BIOS. Usually, this can be done without too much trouble and you can build a new BIOS out of modules.

Alternative BIOS'

Even though you're probably used to names like Phoenix, Award, or American Megatrends when it comes to the BIOS of systems, there is a wide range of BIOS vendors. Years ago, there was even a third-party BIOS by the name of Mr.BIOS from Microid Research in the early 90s. Though now defunct, Mr.BIOS presented an alternative model to the PC's BIOS that is today again taking off.

The original Mr.BIOS was made to work with a limited range of motherboards, but offered increased functionality over mainstream BIOS' at the time. It offered, for example, RAID functionality without the need for a separate RAID controller, and it worked rather well – although Windows had to be told to access the 'BIOS RAID' as an 'Int13' device, aka directly.

Today, the complexity of hardware and the high rate of churn for motherboards doesn't often allow third-party BIOS' to be practical, but there are still two key and somewhat opposing alternatives:

Linux BIOS is a free software project aimed at replacing proprietary BIOS'. It's designed to perform simple hardware initialisation and then run a *payload* that can include boot managers like GRUB, or even a Linux kernel. Linux BIOS is already used extensively for embedded devices, as well as the popular OLPC (One Laptop Per Child). It's also designed to be extremely fast, and can boot to a Linux console in three seconds. The range of currently supported motherboards on the Linux BIOS homepage isn't huge, but does include popular architectures like VIA EPIA based boards, server systems, and even a few ASUS boards.

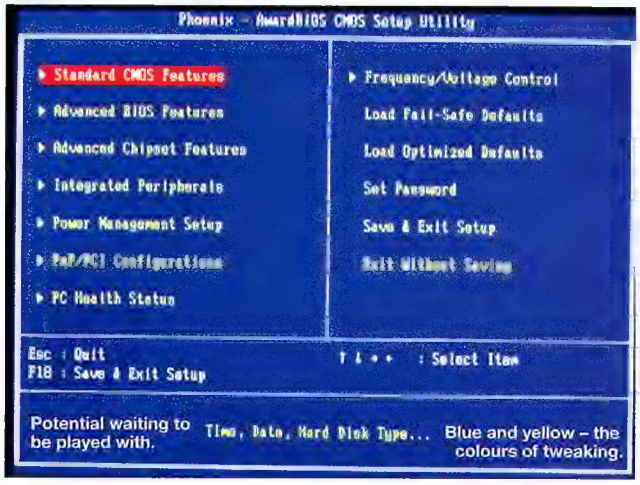
EFI (the Extensible Firmware Interface), officially known as Unified EFI (UEFI) is, like Linux BIOS, intended as a replacement for the age-old PC BIOS. Originally developed by Intel, the EFI specification details unique boot services and even consoles directly accessible via EFI (i.e. before an OS is loaded).

It also allows processor-independent device drivers, meaning video or network devices could be driven before an OS and its drivers are loaded. Finally, EFI can include a boot manager, negating the need for third-party boot managers.

Vista was touted to support EFI originally, but lack of uptake of the new BIOS has seen very few hardware implementations.

The exception is Apple, which adopted EFI for its Intel-based Macs, and so all recent versions of OS X support and use EFI. Because of its proprietary nature and ability to control hardware without an OS loaded, there are fears EFI could be used to forcibly limit users, and be abused as a form of DRM.

Although the BIOS once had a primitive role, these days they are much more complex with ACPI (Advanced Configuration and Power Interface) support and both power and thermal management features. All in all, this legacy from the early PC days is still with us and still an essential part of every PC. EFI may eventually make it obsolete, but it hasn't gone just yet.



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TECHNICAOBSCURA

The big picture behind technology and the world around us

The Internet is for porn?

Ashton Mills answers the greatest question mankind has ever faced.

It's interesting to note that in all the years I've been writing these columns, I've never really felt the need to comment on political issues. Largely this is because politics is a personal thing, everyone has their own well-deserved opinion, and I'm pretty sure you wouldn't want to hear mine.

But I can't keep quiet on this – the gigantic $84 million waste that is NetAlert and the *National Filter Scheme*.

Two key elements stand out about the government's play for votes in this election year -- the complete and utter lack of understanding of the Internet, and the absurd suggestion that software can replace good parenting.

While this *is* a play for votes of the paranoid and ignorant populace that doesn't understand this here Interweb thing, it's also another example of how Australia is being limited by the very people we trust to lead us. It's embarrassing to think Australia is regarded as such a backward country with regards to technology when our government thinks that filtering the Internet is not only *possible* but *desirable*.

What sort of country do we want to become? Are we modelling ourselves off China? Do we really think censorship – regardless of the material – is the best solution? It is the abundance of information, not the lack of it, that gives us power. It is that the world – and the Net with it – is full of the good and the bad, and every shade in-between, that makes us what we are. Any form of trying to control this, diminish it, or limit the flow of it is the beginning of our undoing.

Technically, the filtering is untenable. Societally, it's simply absurd. And responsibility – as ultimately this is what it's all about - lies with the parents. It's all too easy to blame the world in this age, to play a victim to circumstance and give up the power of our choices – hoping, for example, for others such as the government to fix things. But this is a trap perpetuated by our materialistic society at this stage – there's a pill for everything – and unfortunately if we can pass the buck on parenting, we probably will.

> **"We're supposed to be the lucky country – I'd hope that we were the smart one too."**

Responsible use of the Internet by minors is a matter of education, not censorship. It's a matter of interaction and communication with them, not installing an electronic nanny.

Worse, the knowledge that filtering is being used only communicates to them that whatever natural curiosity they have that they want to explore must be wrong – while else would it be censored? This is a travesty of the greatest order.

And let's be clear – if there's a will, there's a way. If they really want to get at questionable material, they'll get it – other sources, other machines and other people.

At the time of writing, Melbourne teenager Tom Wood did exactly this and bypassed the software without disabling its active icon just a few days after release. Great to see our taxes being spent so well.

While some of the other features of NetAlert are commendable – like more resources for tracking down online predators – again the best defence is through education and communication with children, and avoid mistakes in the first place.

The political power play that is the National Filter Scheme is an unfortunate sign that appearances are more important than results. Filtering the Internet is like trying to set fire to water. The myriad classifications, constantly evolving and changing content, the technical impossibilities in distinguishing material, and the central facet of just who gets to decide what is and isn't seen are all part of a quagmire that we should never be dipping our toes into, no matter what the 'perception' of the Net happens to be. We're supposed to be the lucky country – I'd hope that we were the smart one too.

Ashton doesn't jerk around when it comes to the serious business of porn.
amills@atomicmpc.com.au

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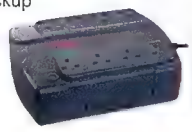

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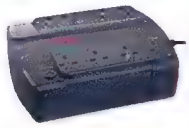

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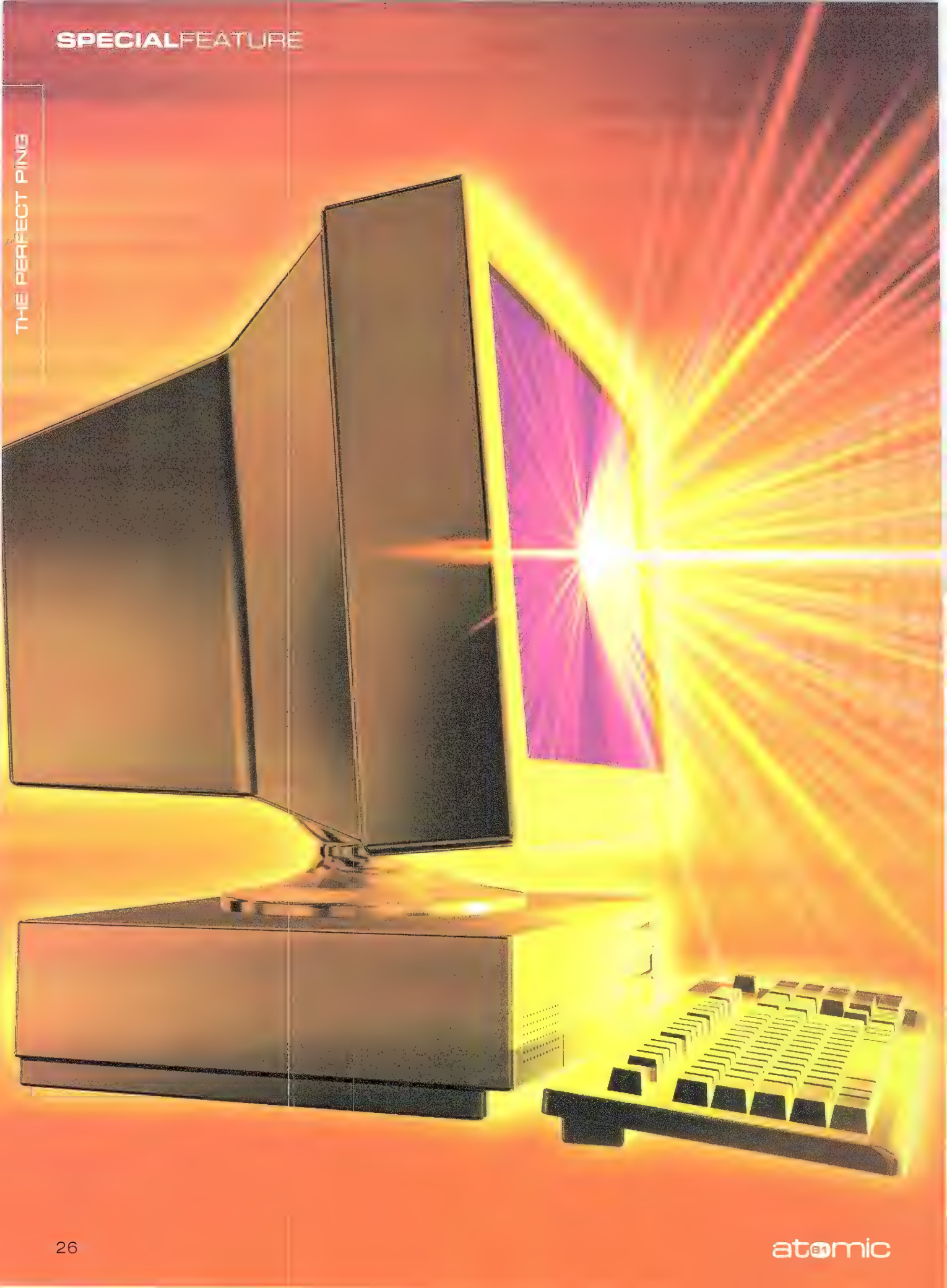


THE PERFECT PING

Got lag? **Ben Brownlee** delves into the arcane arts of protocol stacks, networking tweaking and router revamping.

For a lot of us, owning online is a way of life. It requires focus, dedication and a low, low ping.

Sometimes, though, your ping, also known as latency, can get in the way of some good old-fashioned headshotting. So getting the most out of your home network is a must. This article will show you a few expert tips and tweaks that you can do to your router and Windows registry to help boost your Net performance and make online gaming that little bit smoother.

How online gaming works

When you connect to a server online, you send bits of data, called packets, over a specific port from your public IP address to the public IP address of the gaming server, using a specific protocol – Transmission Control Protocol (TCP) or User Datagram Protocol (UDP). Your public IP address is assigned by your ISP to the outside interface of your router/modem, or whatever device is connected to your phone line. This IP address can change each time you connect to your ISP, unless you pay extra for a static address, which is a must if you are running or planning to run a server.

When you connect using your computer, the private IP address that your network card is assigned is converted to the public IP using NAT (Network Address Translation) and sent to the server as the public IP.

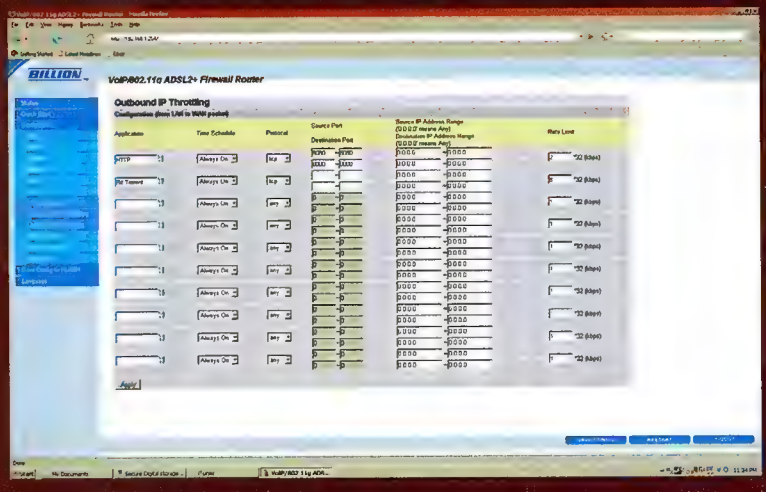
As has been mentioned, when you connect to a server, all packets are sent over specific ports. These ports are unique to each service or game. Contained within these packets is the destination IP, source IP and port. The source IP describes the location of your computer, the destination IP describes the IP of the server you're sending the packet to and the port describes the service the packet is for. Depending on the requirements of the particular application, this service will be TCP or UDP.

TCP is a protocol that can guarantee delivery of packets between computers, as it requires the client and server to acknowledge each other before sending data. UDP is a similar protocol except it won't guarantee delivery – essentially, packets can be sent without a connection, and can be picked up by any application that listens for them. The speed at which you can send and receive these packets depends on the amount of bandwidth your ISP gives you, so faster theoretical speeds equals smoother online gaming.

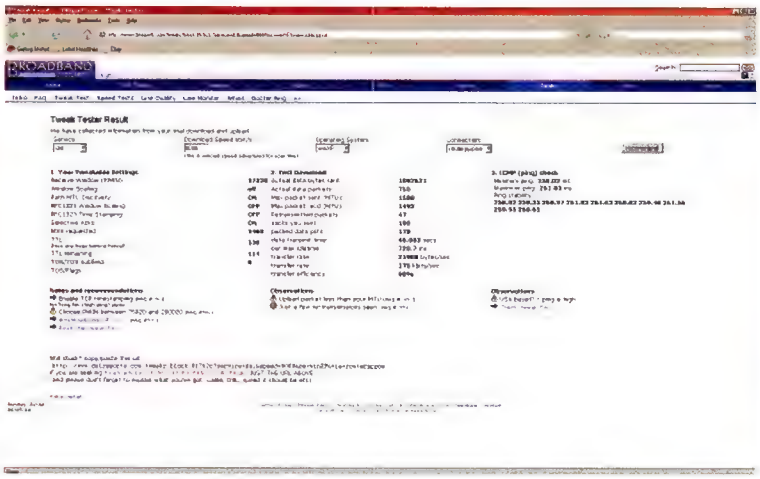
Note that the theoretical and actual speed of your Internet connection can vary depending on a number of factors such as: phone line quality; line distance from the exchange (this can also affect the type of broadband technology you are able to receive) and also the amount of phones you have connected to a single line.

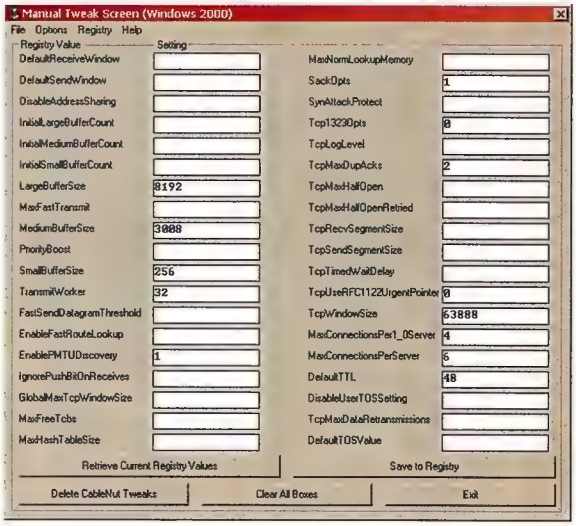
However, this is not always the case. If you're playing your game and you suddenly start to lag, this could be because someone else on the network is using the same Internet connection or there are multiple programs on your computer that are trying to use the Internet at the same time and hogging bandwidth.

As well as programs taking bandwidth, operating systems settings can also restrict the amount of



Below Throttle your ports before they throttle you.





Top Know your maximum speed. Right Tweak that stack until it topples.

available bandwidth that can be used for your game. There are two main parts to your Internet connection you can tweak, your router settings and your Windows network settings.

Router tweaks

Most available off-the-shelf routers from companies such as Linksys, Billion and NETGEAR have customisable settings for most gamers – the stock router configuration is never enough. In order to get the most of your Internet there are some settings you can change.

Please make sure you back up your router settings before attempting any tweaks.

Port forwarding

Games use specific ports over the Internet to communicate with servers. Port forwarding happens when the router forwards a specific port from the Internet to a specific computer on a private network.

For example, you have your gaming computer and a family computer on the same network. You're playing Counter-Strike: Source which uses UDP ports 27020 to 27050 – but the router isn't set up to forward these ports to you. As a result, the router will drop the packets, preventing you from actually connecting to CS: Source servers.

To set up port forwarding, look at what ports you wish to forward, and what IP address you would like the specific ports forwarded to. The documentation that comes with most games can help you isolate the ports they use.

Below Stop your router dropping precious packets.

One problem with port forwarding is the fact that even if there is no traffic over the forwarded port, the port is left open and is vulnerable. One way to help combat this is through the use of a decent firewall, so that the firewall will highlight any incoming requests on the forwarded port and alert you, so you can accept or deny the traffic on the port.

Port triggering

Port triggering is similar to port forwarding except rather than having all traffic on a port forwarded to a specific computer on your network all the time, the traffic will only be forwarded if that computer sends the original traffic. Once the computer has stopped sending traffic, the port is no longer forwarded. This also means that once the computer has finished with the port, the port is closed and not left vulnerable, unlike standard port forwarding. The problem with port triggering is that it is unsuitable for servers as in order to initiate the forwarding of the port the device on the LAN must initiate the traffic – the server must send the traffic before the port is opened.

Also port triggering allows only one user on a network to use a specific port.

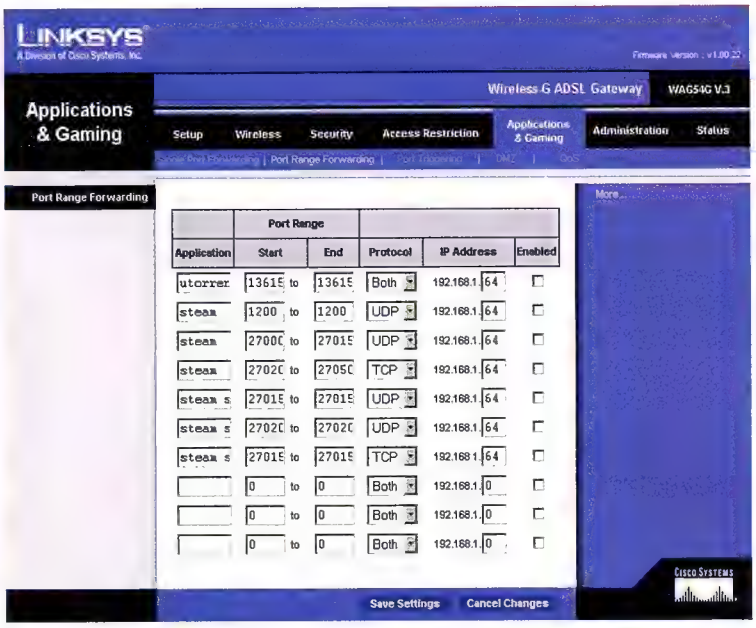
Quality of service (QoS)

With QoS you can basically guarantee that a certain service (your game) gets priority and the most bandwidth so your game works the way you want it to – smoothly and sweetly. There are two main settings of Quality of Service that you can use to help with lag, port prioritising and bandwidth throttling.

Port prioritising: Ever had the problem when you're playing a game and suddenly things get laggy? We have. If you have multiple programs running on the Internet at once, it sucks up your bandwidth. Also, if you're playing your game and another user on your network starts to browse the Internet or download a file, this will take some of your bandwidth and make your game more prone to lag. Port prioritising is a QoS feature available in most routers that can be used to guarantee the amount of bandwidth that is set aside for the ports used for your game. For example, on a 1.5Mb/s connection, you could dedicate 1000 Kb/s to your game ports.

Bandwidth throttling: Bandwidth throttling is similar to port prioritising, except instead of setting aside the minimum bandwidth reserved for your port. It sets the maximum bandwidth used on a specific port.

Say you have a 1.5Mb/s ADSL connection, and the router settings for bandwidth throttling state that the maximum bandwidth for HTTP TCP port 8080 is 64Kb/s, and port TCP 6881 for BitTorrent is set to 256Kb/s. If you're playing a game, and someone starts to browse the Internet, they will only be able to use up to 64Kb/s of the total connection. If someone starts



to download using BitTorrent on port TCP 1515, the maximum speed they will be able to download at would be 256Kb/s, so there would still be sufficient bandwidth to play your game without lag.

Windows XP tweaks

Optimising your router settings is all well and good, but there is still more you can do on the software side. Windows registry tweaks are nothing new. There are some connection testing tools and Windows registry tools available for you to use on Windows XP to help get the most out of you Internet connection.

The tools

Two readily available tools are **www.dslreports.com** and Cablenut. The former is a website that is all about broadband. It contains two extremely useful tools – a speed tester to look at your Internet speed compared to other types of connections, and a tester to see how effective your tweaks are.

The tweak tester will test the Windows TCP stack (the software that Windows uses for your network connection) by sending TCP/IP packets to your computer. After the test it will respond with your Internet speed, packet loss, MTU (Maximum Transfer Unit) and also, the most useful part of all, what settings in the TCP stack should be changed in order to optimise your Internet connection.

Note that the tweak tester only looks at TCP and not UDP. Therefore the tweak tester will only be useful to games that use the TCP protocol.

Cablenut is a freeware app that allows you to enter values into various settings relating to the Windows TCP stack and then from those values, edit your registry automatically at the click of a button. Cablenut is available at **www.student.ipfw.edu/~gottjl01**.

The Windows registry

Although there are programs and tools available on the Internet that can automatically optimise your Internet connection, we like to manually edit the Windows registry. For those of us that do, here are some registry values you can look at. We've also included some recommended values.

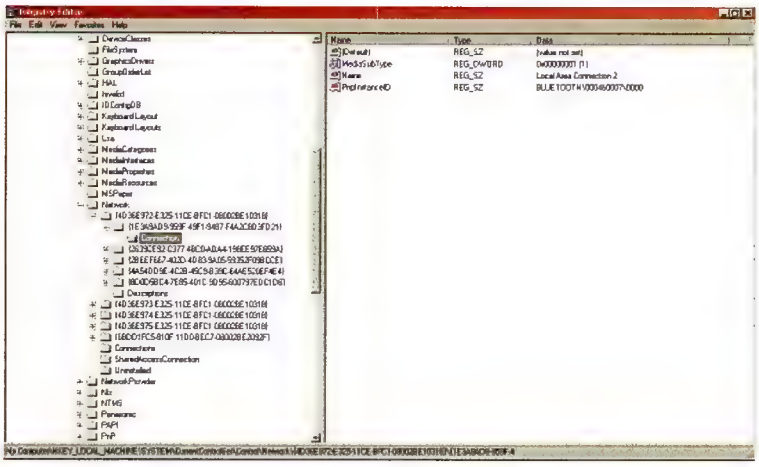
Before making any changes to the Windows registry, always backup it up and any data that you want to keep. You can backup your registry using regedit.

If the registry is incorrectly modified it can cause unexpected errors and you may need to reinstall your operating system.

PMTU Discovery: Path Maximum Transfer Unit Discovery is a feature of Windows XP where the OS automatically discovers the best MTU (Maximum Transfer Unit) for your network connection, saving a lot of hassle compared to setting a static MTU. The MTU is the maximum amount of data in bytes that a single packet can hold. Without this feature enabled, Windows XP automatically sets the MTU to 576, which is too small for DSL. In order to verify that PMTU Discovery is turned on add a DWORD value in HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters called EnablePMTUDiscovery and set the value to '1'.

Static MTU: With PMTUDiscovery, Windows XP will automatically determine the size of the MTU. However you can still set a static MTU, whereby you state the value of what the MTU will be. If you set a static MTU you can disable PMTUDiscovery by creating the value stated in the PMTUDiscovery section and setting it to '0'.

Left Most routers come with plenty of settings to tweak Top QoS, port forwarding, port triggering and more. Bottom left Even more things to play with! Just don't break it.



Top The registry. It's a beautiful thing.

To set a static MTU, create a DWORD value at HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\Interface\{ID for your network card} called MTU and set the value to 1492 for PPPoE (standard ADSL) or 1500 for ADSL with a static IP.

The ID for your network card can be found by looking in the registry entries at HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Network\{4D36E972-E325-11CE-BFC1-08002BE10318}. The next set of hexadecimal numbers contains the connection IDs. To find which connection ID belongs to which network connection, look at each of the registry keys and search for 'Name' in the field 'Connection'.

Path Maximum Transfer Unit Black Hole Detection: This feature detects 'black hole' routers in a network. A black hole router is one that has a MTU smaller than you and cannot notify your computer of this with an ICMP (ping) packet due to a firewall in-between the router and your PC. The black hole detection feature maximises the number of retransmissions over TCP. We recommend that this be turned off as the more retransmissions that are possible, the longer transmission over TCP can take. To turn PMTUBH Detection off create a DWORD value in the registry at HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters called EnablePMTUBHDetect and set the value to '0'.

Time to Live: Time to Live (TtL) describes the amount of time and hops that a packet will live for. The lower this value is set the less time or hops it will live for. The default TtL should be set to around 64, however, it is possible to use 32 or 128. To set the default TtL to 64 add a DWORD value in the registry at HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters, name it DefaultTTL and set the value to '64'.

TCP window size: The TCP windows size sets the amount of packets that can be sent without receiving an ACK (acknowledgment) packet. This ACK packet tells the server that's sending the data that the data has arrived at its destination without fault. Therefore, if you have a larger TCP window size then more packets can be transferred without having to send an ACK packet. However with a bigger TCP window size, if one packet has a problem, the whole window must be retransmitted. Having a nicely-sized window is important. We recommend a window size of 255552 for PPPoE (Normal ADSL) and 256960 for ADSL with a static IP. To set the TCP window size, add a DWORD value named TCPWindowSize at HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters.

Maximum duplicate TCP ACKs: TCP uses a technique called forward acknowledgment, whereby a host receives a certain amount of packets, usually determined by the size of the TCP window, and then confirms which packets have been sent by sending a ACK packet that contains the number of the next packet it expects to receive.

The maximum duplicate TCP ACK sets the amount of ACK packets that will be resent before the connection is dropped. To set the maximum duplicate TCP ACKs, create a DWORD value in the registry named TcpMaxDupAcks, set the value to '2' and place the entry in HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters. By setting this value to '2', only a maximum of two ACK packets will be sent per window until the connection is dropped.

Network card tweaks

Besides tweaking your Windows registry and router settings, there is a term being seen in the networking world known as TCP offloading.

TCP offloading basically makes use of your network interface card (NIC) to perform all processing and calculating related to TCP/IP (error correction, flow control, etc). This can, theoretically, be quite useful as it can potentially free up a lot of processing power from your CPU. Be aware that significant gains regarding the application of TCP offloading in personal computing are yet to be seen.

Also, TCP offloading can only be done on network interface cards that support the feature. Two main parts to TCP offloading include checksum offloading and segmentation offloading.

Checksum offloading: Checksum offloading dumps all the processing and calculating tasks related to error correction to the network interface card. Windows NDIS 5 drivers support checksum offloading, however there have been unofficial and unconfirmed reports that checksum offloading can cause problems with TCP/IP transmission and should therefore only be experimented with (something for you tweak monkeys to experiment with).

Segmentation offloading: Segmentation offloading dumps segmentation tasks to the network interface card. Segmentation is the process of breaking down large packets of data into smaller packets.

TCP offloading theoretically has benefits, but for personal computing the technology is not as useful as it is in high-end enterprise server applications. Due to this fact we recommended that TCP offloading be left off in Windows XP. For those of you that wish to try TCP offloading on your computer, to turn on TCP offloading create a DWORD value in the registry called DisableTaskOffload, set the value to '0' and place the new registry entry at HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters. If you set the value of DisableTaskOffload to '1', TCP offloading will be disabled.

As an aside, Bigfoot Networks Killer NICs use there own version of TCP offloading engines on its cards. These cards are not very good for networking with personal computers or gaming computers, as the performance gains are minimal. We recommend the use of a standard NIC made from a respectable company – Intel, Broadcom, Linksys, Billion, etc – with the use of the standard TCP stack without TCP offloading.

Conclusion

With all the tweaks in this article you can now hopefully enjoy some smoother gaming.

There is still more you can do to optimise your network and Internet connection. With websites dedicated to speeding up your Internet connection with handy hints, registry tweaks and tweaks that can be performed in-game, all the tools to perfect your ping are at your fingertips.

To find the tweaks that can be performed in-game, see your games support website.

Also a good website to find registry tweaks for Windows XP is **support.microsoft.com/kb/314053**.

ASUS PG221
Sharp 2ms Visuals without Ghosting

Smooth Video Displays with Trace Free Technology

ASUS has always been associated with producing cutting-edge motherboards. Lately, their newest product in the LCD market - the ASUS PG221, looks to be excellently designed as well. This new 22" LCD monitor exudes a professional gaming feel, and utilises Splendid™ Video Intelligence, Trace Free and ASCR technologies for superb video and images during gameplay; and provides great 6.1-CH stereo surround sound effects via the SRS TruSurround XT™ Technology.

Trace Free Technology for Smooth, Vivid Gaming

This 22" widescreen LCD monitor utilises a Colour Shine glare-type panel for enriched color density and saturation - delivering crystal clear images. The ASUS exclusive Splendid™ Video Intelligence Technology delivers optimised video performance with intelligent colour, brightness, contrast and sharpness corrections; and provides 5 video preset mode selections (via hotkeys) and 3 skin-tones - enabling you to enjoy excellent image quality during games. The PG221 also adopts Trace Free Technology to deliver 2ms (gray to gray) quick response times for smoother video display without ghosting when running speedy games; and ASCR (ASUS Smart Contrast Ratio) Technology boasts a 2000:1 high contrast ratio to deliver sharper and brighter images.

Rich Gaming Input Options

The ASUS PG221 also has a built-in 1.3 mega-pixel webcam and earphone/microphone jacks to support face-to-face communications. It can even be interoperable with video game consoles, such as XBOX 360, PS3 and Wii.

LOUNGE ROO
LOVE, PA

Adam Turner concludes his stellar tutorial on building the best home theatre PC intelligent spending can buy.

After drawing up a spec sheet for our dream home theatre PC last month, it's time to bring our creation to life. If you happened to miss out on the first part of this guide, it's highly recommended you pick up a copy of *issue 80*.

Below: Sage TV is a nice Windows Media Centre alternative.

Ever onwards

If you want to hook your HTPC up to the television and control it from the couch, you need a '10 foot GUI' – in other words a media centre interface that sits on top of the OS with menus designed to be friendly on the eyes from a distance.

Converts to the Cult of the Penguin will want to check out KnoppMyth, MythBuntu and LinuxMCE, customised distros pre-configured to run Linux media centre interfaces such as MythTV. For those living in Windows land, Microsoft has followed up XP Media Centre Edition with two versions of Vista aimed at the lounge room – Vista Home Premium and Vista Ultimate.

There's debate as to whether Vista MCE is ready for primetime. In our lounge room the PVR is classified as a mission-critical production machine, not an experimental test bed. As such it's tempting to stick with the tried and tested XP MCE, but to back down from a challenge is not the *Atomic* way. We decided to build a dual-boot XP Media Centre Edition and Vista Home Premium box, giving us the benefit of two operating systems for troubleshooting plus the security of XP to fall back on if Vista went pear-shaped.

If you're not ready to embrace Vista, XP gives you the freedom to try a range of third-party media centre interfaces such as Media Portal and SageTV – the latter

MRT 2

We highly recommend keeping your operating system and data on separate partitions...

of which is also available for Linux and Mac. ShowShifter is considered by many to be the original Windows 10-foot GUI, but financial difficulties saw it change hands several times and it's now in limbo. Plans to revive ShowShifter as MediaPhoenix appear to have stalled.

We started by installing XP and Vista on the first of our 500GB SATA drives, allocating 30GB to each. The remainder was earmarked for our existing media library, plus Documents and Settings folders. We reserved the second 500GB drive for recording television. During testing we found this significantly cut down on stuttering when we tried recording two high-definition broadcasts at once while watching something we recorded earlier. If you're using SATA II drives, check the jumpers because they're not always set to SATA II by default.

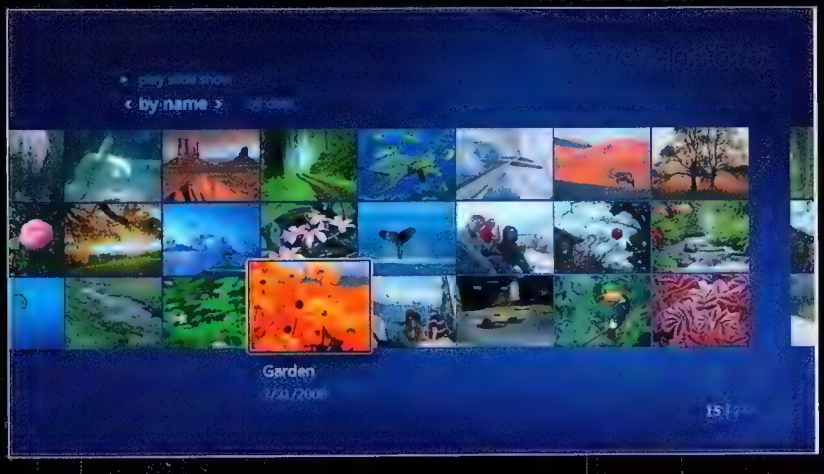
If you're going down the Windows path, do yourself a big favour and get a copy of Acronis True Image 10 Home ($62.99 at **acronis.com.au** with 14-day trial). Compatible with Windows 98 through to Vista, True Image is a time machine for your PC. It lets you take a snapshot of an entire partition and save it as a compressed file to another partition or to an external drive, network drive or removable media. Once you've created your first full backup, subsequent backups can be incremental – meaning you create a smaller file which just notes the changes since your last backup. When your operating system decides not to operate, it's simple to restore the entire partition to its previous state in a few minutes.

True Image is primarily a disaster recovery tool, but it's also a godsend when you're trialling new software and troubleshooting because you can create an incremental backup each time you change something. Previously we've been a Norton Ghost user, but we found Ghost 12 flaky under Vista and it doesn't cope with dual-boot environments as well as True Image 10 Home.

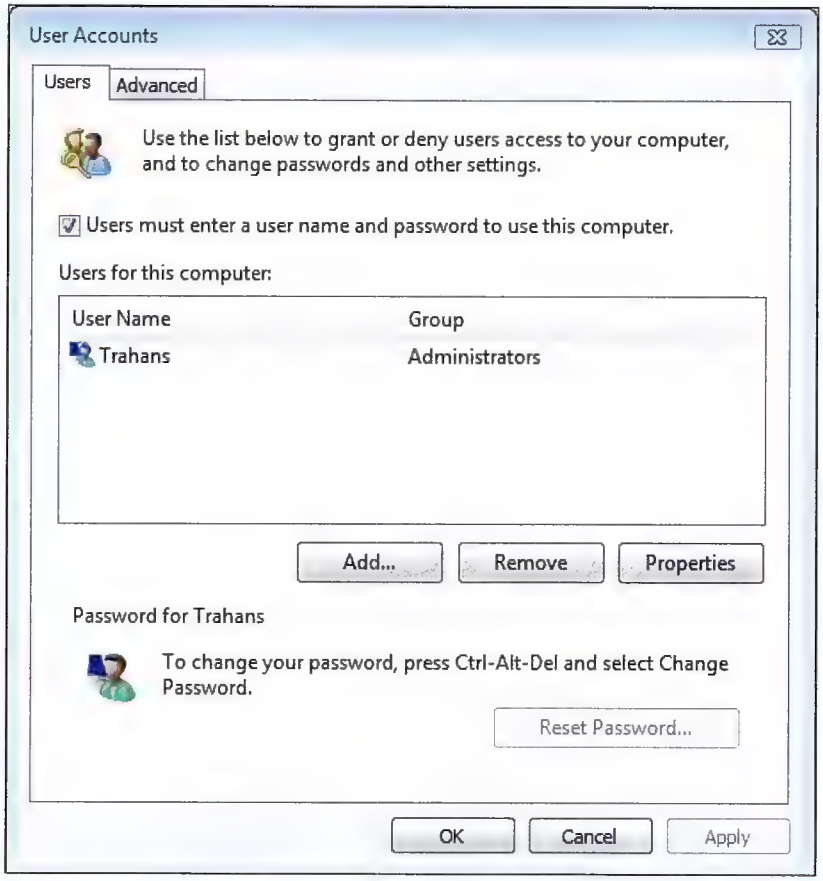
We highly recommend keeping your operating system and data on separate partitions so you can happily restore the OS without fear of losing recent changes to documents. Windows makes it easy to relocate your My Documents folder, but under XP we use Microsoft's TweakUI utility to tell the OS that other folders and data files reside on another partition. Microsoft hasn't released TweakUI for Vista so we've turned to Totalidea Software's TweakVI.

Your primary goal when building a HTPC is stability, which generally means keeping third-party software and plug-ins to a minimum. Of course True Image gives you the freedom to experiment with impunity and start afresh rather than spending days trying to pin down intermittent bugs.

Before you delve into fine-tuning your HTPC, it's time for a little lounge room-friendly Vista optimisation. From the Start menu, run netplwiz and set Vista to automatically log you in on startup. Next, go over to the Power settings in the Control Panel and set the power



Below: Vista's MCE is slick and well integrated with the OS.



Use netplwiz to bypass the standard login screen and log you in automatically for a smoother MCE experience.

button to cause the PC to standby rather than shutdown. Now go into the Sounds settings and disable all system sounds including the startup sound. If you're using True Image or some other form of system restore app, relocate your documents, favourites and other important folders to the data partition. Later you can also use MCE Backup 2.0 (**tinyurl.com/383ddz**) to backup your MCE settings such as recording schedule and recorded programs.

Obviously there are plenty of other Vista MCE hacks, with a long list at **tinyurl.com/2opx9u**, but try to restrain yourself for now. Remember, the more you tweak upfront the more complicated troubleshooting becomes. Once you've fine-tuned MCE you can use the reg hacks on that page to hide unwanted items in the MCE main menu, making navigation easier. You can also use Vista Manager (**yamicsoft.com**) to tweak the Vista interface and disable unwanted services.

Unlike XP, Vista doesn't require you to install a third-party MPEG-2 codec to watch television and DVDs. If you want to experiment with other decoders, such as those from NVIDIA and PowerDVD, the Vista Media Centre Decoder utility (**tinyurl.com/yhuhym**) makes it easy to switch between codecs. Vista only recognises 'certified' MPEG-2 codecs, which means old copies of PowerDVD probably won't work with MCE, but we'll get to the workaround in a minute.

If you're running XP, Microsoft offers a Windows XP Video Decoder Checkup Utility, and you can find DeskShare's free MPEG-2 decoder at **tinyurl.com/aa9d3**.

When you fire up the MCE interface for the first time, run the Custom setup wizard, but don't panic when you're told TV program guide listings are not available for your country – we'll fix that later. After you've finished the wizard, from the main menu go down to Tasks and choose Settings. Under General you can set MCE to start automatically with Windows and always stay on top. Go into Visual and Sound Effects to kill off the annoying ping as you navigate the menus. Enable Optimization to force the MCE interface to restart once a day to improve stability.

Back at the Settings menu, choose Recorder then Recorder Storage to point MCE to your second hard drive. The Library setup lets you point MCE to your DivX collection on the data partition.

Running start

Now you've got MCE up and running, it's time to address some of its shortcomings. While Vista comes with an MPEG-2 decoder, you still need to install third-party codecs to play your DivX collection and other formats. The Vista Codec Pack (**tinyurl.com/3cc9ac**) is your one-stop codec shop, offering codecs for XviD, ffdshow, QuickTime, RealMedia and MPEG-2 as well as DirectVobSub for handling subtitiles and AC3Filter for playing AC3 and DTS sound tracks. On this page you'll also find links to lots of useful utilities such as the Video Decoder Checkup Utility, which lets you use non-Microsoft certified codecs with Vista MCE.

On some systems, the version of ffdshow included in this codec pack can cause MCE to crash when previewing videos. To overcome this problem, you can download ffdshow tryouts (**ffdshow-tryout.sourceforge.net**). It's based on the original ffdshow, but includes bug fixes and performance tweaks.

Next stop is AnyDVD (US$49 from **slysoft.com**, 21-day trial), which turns MCE into a region-free DVD player and lets you skip those pesky FBI warnings. AnyDVD also strips CSS encryption so you can backup DVDs or rip them to the hard drive. It can also force your optical drive to spin slower when you're watching DVDs to keep things quiet. Upgrading to AnyDVD HD strips AACS encryption from HD-DVD and Blu-ray movies and lets you watch movies in high-definition even if you don't have a HDCP-compatible graphics card or display.

The Vista MCE interface doesn't show DVDs ripped to your hard drive by default, but you can enable the DVD library by following the instructions at **tinyurl.com/2ps7xo**. You can also try My Movies **mymovies.name** to rip DVDs and add them to your library (with the help of AnyDVD). MovieMe **tinyurl.com/2p9yky** automates the process of adding DVD covers and information to movies stored in your DVD library.

The ability to automatically buffer what you're watching, thus letting you pause and rewind live TV, is one of MCE's great features. You'll find a reg hack for extending the size of the buffer at **tinyurl.com/2opx9u**. Unfortunately the buffer is reset if you accidentally change channel, throwing you forward to the present. Timeshift-Buffer Backup (**tinyurl.com/2ymc98**) lets you save what's in the buffer as a recording and can also recover the buffer if you accidentally change channels.

The next thing you'll want is an Electronic Program Guide (EPG) so you can browse the week's viewing on your screen and scheduling recordings. An EPG has been a hot topic in Australia, with the networks reluctant to provide one. Third-party EPG providers such as **icetv.com.au** have filled the gap (from $2 per week, 14 day trial), and Nine's lawsuit against IceTV failed. While there are free unofficial EPGs available from sites such as epgstream.net, IceTV's subscription offers extra features such as

programming your recordings via the web or even your mobile phone.

In July, the television networks finally conceded to sharing their programming schedules electronically for free, but only to devices that use DRM to stop people copying the schedule. It looks like PVR makers will need to modify their equipment for Australia to access the guide and existing off-the-shelf PVRs won't be compatible without at least a firmware upgrade. The networks aren't keen on supporting devices that let you skip ads, such as media centre computers and PVRs from the likes of Topfield and Beyonwiz, so the news probably won't help HTPC owners.

Of course an EPG is almost useless in Australia anyway because, as every *Star Trek* fan knows, the networks deliberately don't start shows on time. In the MCE settings, you can pad out the recordings to start up to four minutes early and run up to four minutes over – but of course this isn't nearly enough in Australia. IceTV's setup software lets you extend this to 60 minutes.

When creating a recurring recording, you can edit the advanced settings to set it to run over by up to three hours. MCE Customizer (**mcedev.com**) also lets you tweak the pre and post-recording padding, along with other useful features such as setting the format for the file name of recordings.

Despite our initial reluctance, we found Vista to be very stable and reliable. Microsoft has addressed stability issues with Vista's MCE interface and EPG, issuing several hotfixes. You'll find download and installation instructions at **tinyurl.com/2gmpxp** along with a hotfix for de-interlacing issues.

All in the details

While Vista impressed us, the Vista graphics card drivers did not. If you've opted for an NVIDIA card you'll be disappointed to discover that, as of ForceWare 162.22, NVIDIA hasn't yet enabled some of the most important features in its Vista drivers.

Problem number one – NVIDIA has scrapped its full screen video mirror feature. This feature would let you play a video full screen on one display (your television) while you use the computer for other things like web surfing on another display (your monitor). This is a really useful feature if your home theatre PC doubles as a general purpose PC conveniently located in the living area. With an NVIDIA card under Vista, the only workaround for this is to run your desktop

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even if you do have a fancy high-def TV, NVIDIA under Vista doesn't support hardware MPEG...

across both displays and drag the video window to your second display – a far from elegant solution which creates all kinds of problems when apps start stealing focus from each other. You can also run into performance issues when running two displays, even in clone mode.

According to NVIDIA, full screen video mirroring 'is no longer supported due to the new Protected Video Path Output Content Protection (PVP-OPM) in Windows Vista'. This sounds like a reasonable excuse, until you realise that ATI cards still offer this feature under Vista – it's called 'theatre mode'. The problem is we couldn't get ATI's theatre mode to work under Vista. It worked under XP, but only with apps like Windows Media Player or PowerDVD and not the MCE interface. Considering the whole point of an MCE box is to access everything through the one interface, theatre mode seems a bit pointless.

Problem number two – ATI has enabled overscan adjustment in Vista for low-res displays, but NVIDIA hasn't. This means if you don't have a fancy new high-def television, chances are with an NVIDIA card you won't be able to see all of the television picture and the MCE pop-up menus on your television screen. Under XP you can adjust the size of the image so it fits your television screen, but with NVIDIA and Vista you're stuck with what you get.

Running the Vista MCE setup wizard can reset the position of the MCE pop-up menus so they're not off the screen. If this fails, you can adjust the menu positions using reg hacks listed at **tinyurl.com/2opx9u**. Even now you're still missing the edges of the show you're watching. When you close the MCE interface the edges of the desktop are also lost, putting the start bar and taskbar frustratingly out of sight.

Problem number three – even if you do have a fancy high-def television, NVIDIA under Vista doesn't support hardware MPEG acceleration for Vista's default MPEG codec. This means the graphics card isn't doing its fair share of the work when it comes to playing video files, instead it dumps all the load on the CPU to be done in software. This makes it harder to get a good picture when you're juggling a few high-definition recordings. Again, ATI doesn't have a problem offering this feature.

Problem number four – under Vista, NVIDIA doesn't offer hotkeys for actions such as switching monitors (try UltraMon: **realtimesoft.com/ultramon**).

NVIDIA's lack of hardware acceleration was noticeable when watching Saturday night AFL on Channel 10 in high-definition on our test displays – a 40-inch Sony Bravia 1080p LCD and Epson TW-1000 1080p projector. Using the NVIDIA GIGABYTE GeForce 8600 GTS GV-NX86S256H 256MB there was clearly more pixilation during fast play than with the ATI HIS Radeon X1650 Pro iSilence II 256MB. We also think DVDs looked slightly better under ATI, with the NVIDIA card more prone to a slight 'comb' effect where moving images looked jagged.

Sadly it wasn't all good news for ATI either using the Catalyst 7.5 drivers. Using Vista's default MPEG-2 decoder we noticed the images were burning for a few seconds, so when you cut to the next scene you could still see the last scene like a watermark. It stood out most clearly in animations. Switching to PowerDVD 7.0's decoder fixed this, but now DVDs didn't look quite as good.

A reg hack for the DetailEnhance settings (**tinyurl.com/2ql62y**) fixed the problem with Vista's default MPEG-2 decoder. Setting the colours to MCE rather than PC in the ATI drivers also improved the picture.

One problem we found with both ATI and NVIDIA is the picture contrast isn't nearly as good in Vista as in XP. It wasn't noticeable on the Sony Bravia but it was very clear with the Epson projector (connected with DVI-to-HDMI) and with our old CRT television connected via composite. No matter how much we tweaked the brightness and contrast in the driver settings or on the television/projector, we just couldn't get the fine details in the shadows. Switching to XP MCE made an enormous difference.

When we finally got our hands on a fanless ATI Radeon 2600 XT (GIGABYTE GV-RX26T256H) we discovered that its SilentPipe II heatsink is too tall for the Antec Fusion cases, but happily fits in SilverStone's GD01MX. Running the 2600 XT and Catalyst 7.6 drivers, the contrast problems of the X1650 Pro improved but the image burn problem didn't. Upgrading to Catalyst 7.7 seemed to disabled the MPEG hardware acceleration, which meant 1080i high-definition AFL looked shocking – worse than standard definition. Catalyst 7.8 fixed the image burn problem but not the MPEG hardware acceleration. Of course you always get such fun and games with new graphics cards, and we'd recommend following the 'ATI Radeon HD 2X00 (2400,2600,2900) series owners' thread at **avsforum.com** for the latest updates.

Running the X1650 Pro with Catalyst 7.8 still saw 1080i high-def AFL sing. Disappointingly it struggled with out 1080p test file *The Magic of Flight*, while the newer 2600 XT and 8600 GTS cards coped much better. All things considered, we'd recommend opting for the ATI Radeon 2600 XT and sticking with Catalyst 7.6 for now if you own a high-def television – testing various hacks and playing the driver-waiting game until ATI can get all its ducks in a row.

Just as we went to print, NVIDIA released 163.44 beta drivers which reportedly add MPEG hardware acceleration for the 8400, 8500 and 8600 under XP, but only the 8500 under Vista.

Remote viewing

Once you have your lean, mean MCE machine up and running it's time to sit back on the couch and play with your remote control. There's no shortage of remotes around, they can come with your tuner card, LCD/VFD readout or even your motherboard.

The remote control supplied with our SilverStone MFP51 LCD is SoundGraph's very impressive iMON PAD Remote Controller (**soundgraph.com**). Along with all the AV buttons you'd expect on a television or DVD controller, the remote also features a four-way pad that you can toggle between mimicking the cursor keys and controlling the mouse. Even when troubleshooting you'll rarely need to get off the couch thanks to left and right mouse buttons along with the Windows key, Enter, Escape, Application Launcher and Task Switcher.

By default the iMON PAD is overly sensitive, so when you're navigating menus with the pad it's easy to go sideways instead of up. Tweaking the repeat rate helps but it still requires a delicate touch. The main disappointment is that the iMON PAD can't be programmed to control other devices such as your television and amplifier. At the same time the iMON PAD has a reputation for being difficult to map to other universal remote controls. Switching to a universal remote also means forgoing the ability to control the mouse unless your universal remote has a similar four-way pad (like the Logitech Harmony range).

TROUBLESHOOTING TIP

We can't foresee every possible problem you might encounter, which is why we highly recommend heading over to the forums at **xpmediacentre.com.au** and introducing yourself. Other great sources of advice include **thedigitallifestyle.com**, **mediacenterexpert.blogspot.com** and **thegreenbutton.com**. Still, here's one frustrating problem you're likely to encounter.

Windows has an issue with its standby timer that can appear at first to be a problem with your remote control. Windows shuts down the monitor and then later goes into standby mode if it doesn't receive any input after a certain amount of time. The problem is Windows sometimes fails to register button presses on the remote as an input event. The monitor shutdown and standby modes are suppressed while you're watching video, but once you stop the video, Windows decides that you haven't pushed a button for a while and so switches off the display or puts itself into standby. As you're still holding the remote from having stopped the video, you make the not unreasonable assumption that the remote control is generating phantom button presses.

The solution lies in the Microsoft Standby Tool (**tinyurl.com/2r9oj3**), which is designed for XP but will run on Vista. The Microsoft Standby Tool is a handy utility for troubleshooting all sorts of power problems, such as your machine failing to sleep or wake properly for scheduled recordings. It can also help deal with USB devices that fail to work properly when your computer awakens.

When you revive Vista MCE from standby, it insists on returning to the main menu even if you were previously watching live TV. The Microsoft Standby Tool can force MCE to return to the live TV mode – making your HTPC feel more like an AV device. It also makes life easier for other members of the household who just want to watch TV.

While the iMON PAD is extremely useful, it's easy at first to dismiss the accompanying SoundGraph LCD readout as expensive eye candy. It can scroll all kinds of data but despite the choice of six settings, plus Automatic, it never quite seems to tell you what you want to know when you want to know it. Do you really need RSS news feeds or email alerts scrolling across the front of your HTPC when you're trying to watch a movie?

Then you discover FrontView (**mediacentermagic.com**), a plug-in for the software that integrates tightly with MCE and lets you control the display to the nth degree. If the free version of FrontView 4.0 doesn't meet your needs there are also Basic (US$19.95) and Advanced (US$29.95) versions. FrontView takes some time to master, but once you do you'll consider the LCD a worthy addition to your HTPC.

SilverStone's GD01MX home theatre case and Antec's Fusion Black both include the same SoundGraph LCD, although the Fusion Black doesn't come with the remote control. Also, in the Fusion Black some of the LCD's software features are missing (including the ability to run FrontView) and the display has a deep blue tinge which makes it much harder to read.

We built it, they came

If you're prepared to put in the work, a Vista media centre does deliver on its promises. Keen media centre users will tell you a finely-tuned MCE box will run rings around a dedicated PVR and they're right, but the key phrase here is 'finely-tuned'. Your average person doesn't want to spend weeks fine-tuning a device – they expect it to work as advertised out of the box. You're never going to get this with a PC because with functionality comes complexity. If you want an idiot-proof lounge room device then go for something like the Apple TV – it does what it does very well, the problem is it doesn't do very much.

Vista's MCE interface is certainly ready for primetime and while the Vista graphics card drivers are still a work in progress, they'll improve with time. Meanwhile, if you're prepared to invest the time and effort, you will be rewarded with the one box to rule them all.

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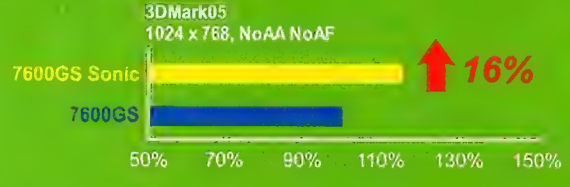

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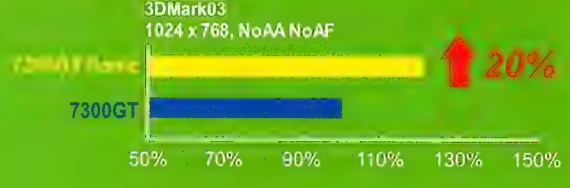

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HARDCORE

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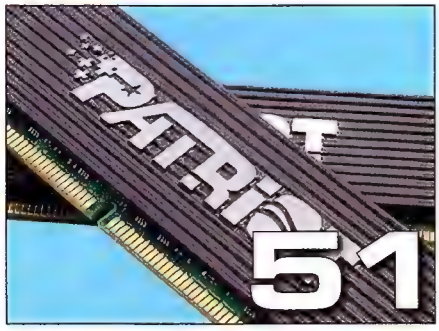
This month we saw a large swag of drool-worthy hardware with perhaps some of the best innovations and progressions in the enthusiast computing space.

As with last month, we've been blessed with the presence of some ludicrously overclockable and enjoyable products. Such samples include the first Micron D9-based DDR3 to hit the labs, a micro-ATX overclocking fiend, a refreshing kit of DDR2 in an already incredibly jam-packed market and a HDMI-capable NVIDIA 8-series graphics card.

So much hardware that we don't have enough space in this little blurb – and then there's Ground Zero. Phew! We're sure you'll enjoy it all!



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BENCHMARK

How we test, what we test, when we test it

3DMark05 and 06 are the legs of our bench. As freely downloadable tools, they allow people all around the world to compete on a single platform, regardless of its indication of real world application, and its ability to keep our table stable.

On the gaming surface, Call of Duty 2 takes first honours in the FPS department. Quake 4 follows closely behind for our OpenGL benchmarks, taking over from where the venerable Doom 3 left off and offering multiple CPU optimisations. Half-Life 2 remains, its market penetration simply too huge to ignore. X3: Reunion makes an appearance, in an effort to have a benchmark that is not an FPS. In the same line, Splinter Cell: Chaos Theory has also been added. Other games do exist. Honest.

All tests are run at 1280 x 1024, 1600 x 1200 and 1920 x 1200 with vsync off, to cater for the most popular LCD resolution, CRT resolution and those who own widescreen monsters respectively.

To hit the CPU, we use LAME MT, a multithreaded version of the popular MP3 encoder, which is used to compress a standard 30-minute WAV file. Similarly, VirtualDubMod is used to compress a standard 1GB raw video file into XviD at 1300Kb/s. Other CPU specific tests in our stable are Maxon's CineBench and SuperPi Mod. Rounding out the suite, SiSoftware's Sandra tests several subsystems across the board, while HDTach and ATTO Disk Benchmark helpfully provide hard drive scores.

All these tests are run on a Windows XP SP2 platform, running the latest official drivers available. Every test is run three times to eliminate any oddities that may crop up along the way, the final result printed in the magazine being an average of those scores.

Of course, all this is pointless without a standard set of hardware, and as such it is laid out below for the world to see. On with the testing!

The *Atomic* Hot Award is given only to the best. In our roundups, we differentiate the best further using the following awards:

VALUE AWARD This means the product is the best buy price-wise.

PERFORMANCE AWARD Price isn't a big factor – it just has to make our benchmarks burn and our eyes water.

EXTREME AWARD Forget everything. If it's *mind-blowingly amazing*, then it'll get an Extreme Award.

BENCHMARKS

Graphics

3DMark05
Game tests only, 4xAA, 8xAF
www.futuremark.com

3DMark06
Game tests only, 4xAA, 8xAF (SM2.0), 8xAF (HDR/SM3.0)
www.futuremark.com

Half-Life 2
Canals custom timedemo, 4xAA, 8xAF, all details highest, HDR off
www.half-life2.com

Splinter Cell: Chaos Theory
Lighthouse Demo, Shader Model 3.0, 8xAF, shadow resolution high, all features on
www.splintercell3.com

X3 Rolling Demo
High settings, auto quality control disabled, glow enabled, 4xAA, 8xAF
www.egosoft.com/games/x3/info_en.php

Call of Duty 2
Hill 40 – Defend custom timedemo, 4xAA, 8xAF, all options highest
www.callofduty2.com

Quake 4
High quality, 4xAA, 8xAF, Multiple CPU support, all options highest
www.quake4game.com

Subsystems

HDTach
www.simplisoftware.com

LAME MT
softlab.technion.ac.il/project/LAME/html/lame.html

VirtualDubMod
virtualdubmod.sf.net

SuperPi Mod
www.xtremesystems.com/pi

Cinebench
www.cinebench.com

SiSoft Sandra
www.sisoftware.co.uk

Everest
www.lavalys.com

Others

DisplayMate
www.displaymate.com

ATI Tool **www.techpowerup.com/atitool**

RivaTuner
www.guru3d.com/rivatuner

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Stress Prime 2004 Orthos
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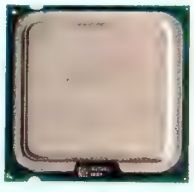
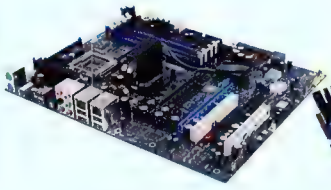
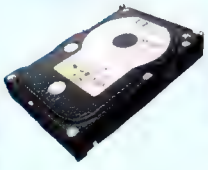


▲ Intel Core 2 Duo X6800



▲ EVGA 680i SLI

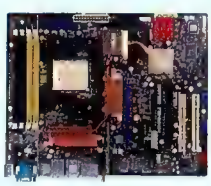
▲ 2GB Corsair Dominator PC2-10000



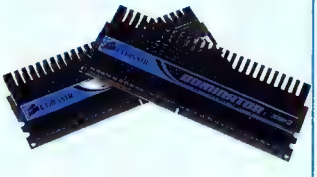
▲ WD 1500ADFD

▲ Enermax Galaxy 1000W

▲ AMD Athlon 64 FX-62



▲ ASUS M2N32-SLI Deluxe



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▲ Dell 2405FPW

▲ ASUS 8800 GTX

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WA	Austin Computers	08 9201 2788	www.austin.net.au/index.asp
	Trinix Computers	08 9350 1600	www.trinix.com.au
	YNOT Computer Systems	08 9330 7666	www.ycs.net.au
	Netplus Micro Computers	08 9242 7288	www.netplus.com.au

Rise of the Radeon

Josh Collins gets up close and personal with the latest mid-range AMD ATI cards. 3D silicon beasts or expensive bits of plastic? Your answer inside.

AMD ATI's response to NVIDIA's less costly GeForce range is here, in the form of the Radeon HD2600 series and HD2400 series.

These budget-orientated cards come into the hostile environment that is the mid to low-range graphics card market. With the halo effect of the higher range series often influencing the sales over this contentious segment, it could be said that AMD ATI is facing an uphill battle against the green machine.

However, if history is anything to go by, affordable ATI cards have generally done quite well. For this reason, we're looking forward to seeing what this hardware has to offer.

How we test

It was important that we alleviated all bottlenecks on these cards and due to the relatively small bandwidth needed to feed these cards, compared to that of the high-end 8800 and HD2900 series graphics cards, we soon settled on our system specifications and settings.

For the roundup we made use of the following hardware:

- ASUS Blitz Extreme
- Intel Core 2 Duo X6800 @ 3GHz (333MHz FSB with multiplier of nine)
- 2GB kit TEAM Xtreem DDR3-1600 7-7-7-21 @ DDR3-1333 6-6-6-18
- Western Digital 74GB Raptor
- Enermax Galaxy 1000W PSU
- Dell 24" wide screen LCD monitor
- Microsoft Windows Vista Ultimate 32-bit

The benchmarks used for testing were:

- 3DMark06 DX9 benchmark @ default
- Company of Heroes DX10 benchmark @ 1280 x 1024
- Company of Heroes DX10 benchmark @ 1680 x 1050
- Call of Juarez DX10 benchmark @ 1280 x 1024
- Call of Juarez DX10 benchmark @ 1680 x 1050

BENCHMARKS

Company of Heroes

Resolution: 1280 x 1024; 1680 x1050
Shader quality: Direct3D 10
Model quality: High
Antialiasing: None
Texture detail: Ultra
Shadows: High
Reflections: High
Post-processing: On
Building detail: High
Physics: High
Tree quality: High
Terrain detail: Ultra
Effects fidelity: Ultra
Effects density: Ultra
Object scarring: On

Call of Juarez

Resolution: 1280 x 1024; 1680 x 1050
Full screen: Yes
Details: Custom
Shadow map size: 2048 x 2048
Shadows quality: High
Antialiasing: None
Audio: Disabled

Some readers may question the use of the Call of Juarez DX10 benchmark due to its known performance preference for ATI cards. This however is not a concern when benchmarking does not include any NVIDIA hardware. Additionally, being one of the recently released DX10 titles, it offers a good selection of features that will be integrated into newer titles.

Company of Heroes was selected due to its popularity as well as being outside of the FPS genre so commonly used for benchmarking graphics cards. The game is graphically intense, particularly once patched to support DX10 functionality under Windows Vista.

3DMark06 is a well-known and respected benchmark and stresses the limits of the DX9 API. It's a common part of our standard benchmark suite as well.

The mid-to-low end HD2000 series cards, much like their GeForce 8-series competition, are being marketed as DX10 capable devices set to enhance your gaming experience. Whether it can cut the mustard is another question altogether.

Admittedly we are setting ourselves up to see some low scoring results, particularly from the cut-down HD2400 series cards, however this still allows for an apples-to-apples comparison with the other accelerators within the mid-to-low end HD2000 series of 3D cards.

HD2400 and HD2600-series monitor woes

During testing we came across an incompatibility issue with older monitors and as such we see it as important to advise individuals looking to purchase HDMI-capable graphics cards.

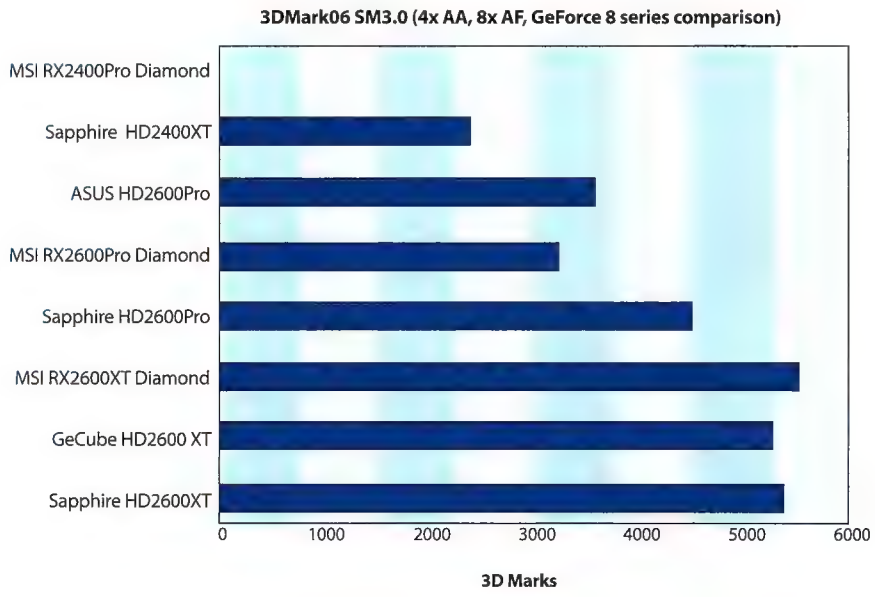
The HDMI implementation on these cards sends a HDMI signal through the DVI port, which is then connected to a converter to obtain the HDMI output connection.

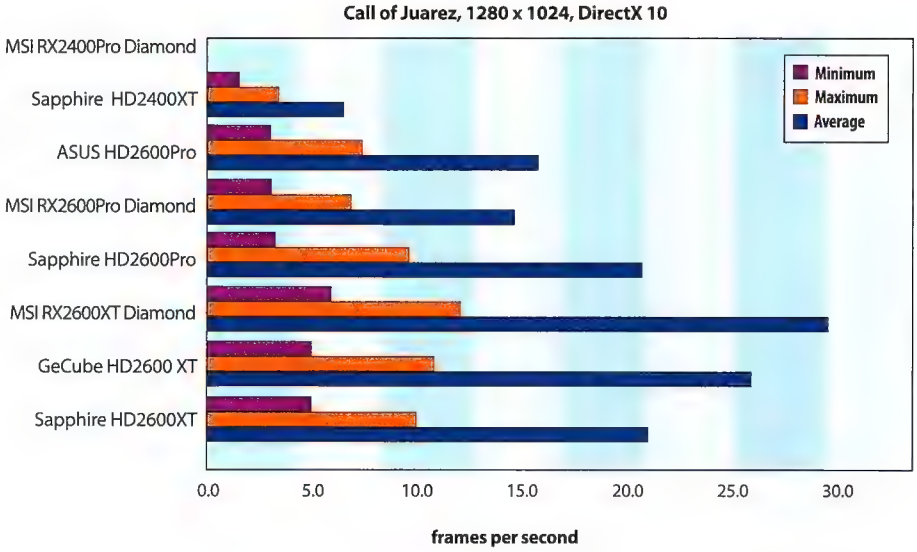
Due to the HD2400 and HD2600 series' ability to also do sound processing (full HDMI specification, not just video like the NVIDIA 8-series), the DVI output not only plays host to the video signal but now also a possible audio signal.

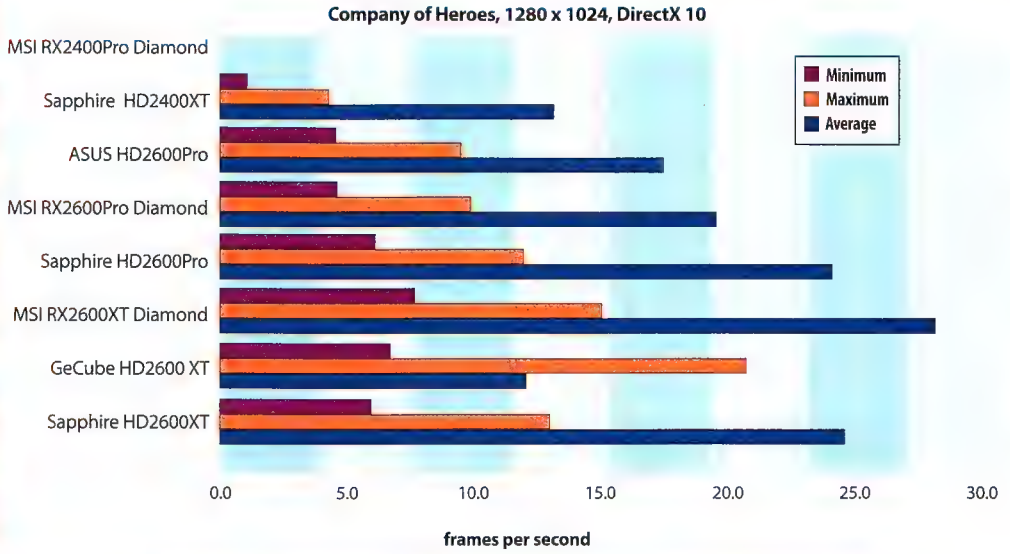
We found that during testing the HD2400 and HD2600 series could not be used in conjunction with our BenQ 24" widescreen LCD monitor, among other monitors currently in the labs, while the Dell 24" LCD monitor was capable of reproducing the video to the screen when plugged in to replace the other monitors – thus ruling out a hardware failure.

The extent of this incompatibility is currently unknown; however the trend of this inability to reproduce the signal appears to be with older monitors.

We tested multiple motherboards with differing chipsets as well as multiple kits of memory and power supplies as to sure this issue was isolated to a relationship between the HD2400 and HD2600 series and a group of particular monitors. Unfortunately, as previously stated, the extent of which this incompatibility and the range of monitors is unknown at the time of printing.







Sapphire HD2600XT

Supplier **Sapphire** Website **www.sapphiretech.com** Street Price **$164**
Core clock **800MHz** Memory clock **2200MHz** Memory **256MB GDDR4**
Stream processors **120** Memory bus **128-bit** CrossFire support: **Yes**

The Sapphire HD2600XT is a reproduction of the AMD ATI reference card with the only differing characteristic being a Sapphire sticker on the cooler's fan.

This isn't a bad thing though. The reference cooling hardware is actually quite effective and in addition the heatsink and fan is single slot. Add to this the card's stock cooling is quiet in comparison to the competition, being hard pressed to be heard over the sound of the other components in the system. All things considered, this card is well-suited, with its HDMI functionality, to be used in a home theatre PC.

Scoring the second highest 3DMark06 result in the roundup and generally being the 2nd or 3rd fastest at processing the game benchmarks, this card has a strong combination of stealth and Rambo characteristics. A card stealthy enough to be integrated into a HTPC and Rambo enough to stand up as a gaming card, albeit with the eye candy turned down. This card is a confident compromise below the headlining product series and with the added ability to be placed in a HTPC. If looking for a card within these series, this would be our choice.

SCORE **7.5** OUT OF 10

GeCube HD2600 XT

Supplier **Protac** Website **www.protac.com.au** Street Price **$160**
Core clock **800MHz** Memory clock **2200MHz** Memory **256MB GDDR4**
Stream processors **120** Memory bus **128-bit** CrossFire support **Yes**

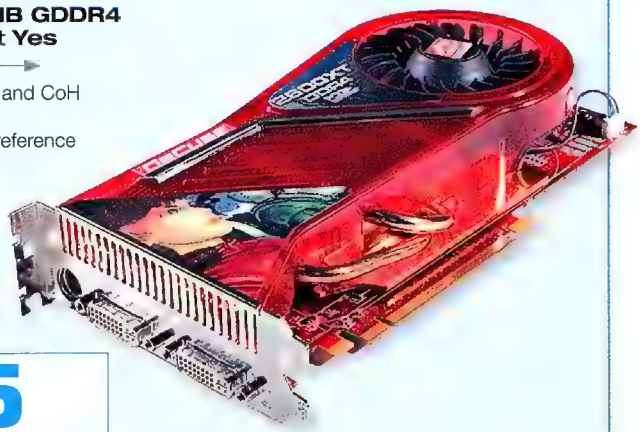
The GeCube offering scored slightly below the Sapphire HD2600XT in 3DMark06 and CoH @ 1280 x 1024, yet surprisingly beat it in all other benchmarks.

With that statement made, we would still choose the Sapphire HD2600XT in preference over the GeCube HD2600XT.

Our reasons for this are varied and many. One reason is due to the fact that while stressed under 3DMark06, the card produced pixilation in a number of the tests run during the suite as well as crashing the first run of CoH at 1680 x 1050.

This was unnerving to be seen from a product running at stock specifications and with a larger two-slot heatsink fan cooling the unit, in comparison to the Sapphire's reference design, single-slot cooler.

As stated, there was a small increase in performance in the majority of the tests over the Sapphire; however the behaviour exhibited during 3DMark06 load and entering the initial CoH 1680 x 1050 test was anything but confidence building.



SCORE **6.5** OUT OF 10

MSI RX2600XT Diamond

Supplier **MSI** Website **www.msi.com.tw** Street Price **$200**
Core clock **850MHz** Memory clock **2300MHz** Memory **512MB GDDR4**
Stream processors **120** Memory bus **128-bit** CrossFire support **Yes**

Packed with an additional 256MB of GDDR4 as well as featuring a 50MHz higher core clock and an extra 100MHz effective (50MHz actual) memory frequency, it should come as no surprise that this card topped the roundup when it came to a pure performance comparison.

Scoring an extra 150 3DMark points above the second place Sapphire HD2600XT and on average scoring an extra two to three frames per second in all benchmarks, when compared to its 256MB-fitted HD2600XT brothers, this was the obvious highest performer of the pack.

With this performance however brought with it a dual slot non-reference cooler which, unlike what would be expected of its design, is quite noisy, at times creating more noise then the rest of the testing system – particularly when under load.

If you're simply after the highest-performing card within the HD2600 series, this would be the choice of the cards. That said, it's the Sapphire HD2600XT that we recommend for fulfilling a more general listing of features and functionality.

SCORE **7.0** OUT OF 10

Sapphire HD2600Pro

Supplier **Sapphire** Website **www.sapphiretech.com** Street Price **$133**
Core clock **700MHz** Memory clock **1400MHz** Memory **256MB GDDR3**
Stream processors **120** Memory bus: **128-bit** CrossFire support **Yes**

Leaping ahead of its HD2600Pro pack in the benchmark criteria and nipping at the ever-so-close heals of the HD2600XT series, this is a card stuck between classes.

With core and memory frequencies higher than that of its HD2600Pro brethren and yet slower then the HD2600XT cards, this graphics card truly is, in all senses of the word, in a class of its own.

Integrating a single-slot cooling solution, as per the AMD ATI reference and a slightly smaller than normal fan, the heatsink is a capable design and great for those looking to incorporate a graphics card into a confined space environment.

Scoring comparative in-game benchmark results as that of the 256MB HD2600XT range; this is a hidden vine waiting to strangle the higher branches. With some mild overclocking the performance of this card could match that of the more expensive HD2600XT cards.

For this reason, we recommend this card as the best value for money graphics card in this roundup.

SCORE **7.0** OUT OF 10

MSI RX2600Pro Diamond

Supplier **MSI** Website **www.msi.com.tw** Street Price **$138**
Core clock **600MHz** Memory clock **800MHz** Memory **256MB GDDR2**
Stream processors **120** Memory bus **128-bit** CorssFire **No**

Featuring lower frequency clocks than other cards in the HD2600Pro class and GDDR2, rather then GDDR3 like the Sapphire HD2600Pro, the specifications of this card leaves a little to be desired within this class, as does the performance.

Scoring 1200 3DMarks below the Sapphire HD2600Pro and 240 3D Marks below the ASUS HD2600Pro, the MSI RX2600Pro Diamond is pushed out of the HD2600Pro market by its competition in the 3DMark06 realm.

With regards to in-game performance, the MSI offering is generally on par with the ASUS card, however the MSI does get affected by the lower frequency memory and this is shown by the slightly lower frame rate and a higher swing between the maximum and minimum frame rates within the game benchmarks.

What the card might lack in performance it makes up for in the sound stakes, being a totally passive heatsink. There is no noise to be heard from this graphics card, just be sure to have space above the card for the fanless heatsink design.

SCORE **6.0** OUT OF 10

ASUS HD2600Pro

Supplier **ASUS** Website **www.asus.com** Street Price **$169**
Core clock **600MHz** Memory clock **1000MHz** Memory **256MB GDDR2**
Stream processors **120** Memory bus **128-bit** CrossFire **No**

Sitting in the middle ground between the good and the bad of the HD2600Pro line, ASUS plays it safe with the use of 256MB GDDR2 but also implementing a slightly higher memory frequency than the MSI offering, with the memory at 1000MHz opposed to 800MHz. This boost in memory frequency creates a distinctive difference in performance, beating out the MSI offering. This raise in frequency however is not enough to get anywhere near the Sapphire card.

The increased memory allows also for a slightly lower swing between the maximum and minimum frames per second.

Also of mention here is the heatsink fan cooling on the card. Similar in design to the common Zalman constructed third-party stuff for graphics cards;,the card is well-cooled and quiet to the ear.

Like other dual-slot heatsink fan cooling however, when paired with a lower-end graphics card, the product becomes restricted with regards to which segment of the market it may take advantage of.

SCORE **6.5** OUT OF 10

Sapphire HD2400XT

Supplier **Sapphire** Website **www.sapphiretech.com** Street Price **$115**
Core clock **525MHz** Memory clock **800MHz** Memory **256MB GDDR3**
Stream processors **40** Memory bus **64-bit** CrossFire **Yes**

Unlike its HD2400Pro cousin, this HD2400XT actually worked under 3D conditions.

Unfortunately for this card, 'worked' and 'playable' are two different words with very different meanings when it comes to games. Yes, extremely different!

That having been said, this range of graphics cards, in all honesty, is not made to be a gaming-orientated graphics card. They just don't have the grunt.

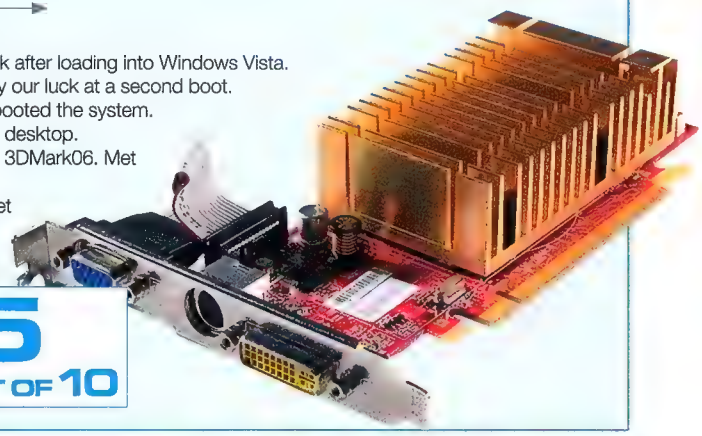
On the flip side, this card is ideal for the implementation within a HTPC, considering the passive cooling and the ultra small profile that won't eat a slot.

The card also features TV-out functionality as well as being HDMI capable through the use of a DVI-to-HDMI output converter. This card would be a good solution as a silent addition to a HTPC system.

SCORE **5.0** OUT OF 10

MSI RX2400Pro Diamond

Supplier **MSI** Website **www.msi.com.tw** Street Price **$73**
Core clock **525MHz** Memory clock **800MHz** Memory **256MB GDDR2**
Stream processors **40** Memory bus **64-bit** CrossFire **No**



This card was an utter non-event.

On the first boot after being placed in the review system, the screen drew a blank after loading into Windows Vista. Not deterred, though a little perplexed as to the reason for this, we thought we'd try our luck at a second boot.

After removing the card from the PCIe 16x slot and reseating it, once again we booted the system.

To our relief the system booted correctly and soon enough we were on the Vista desktop.

Surprised by the initial boot issue though not discouraged, we proceeded to run 3DMark06. Met by the splash screen, we ran the benchmark.

As the first test, Return to Proxycon, finished loading, the screen drew a blank yet again and all responsiveness was lost from the system. After a reset we attempted another two times before ruling the benchmark as failed.

Going on to test further with CoH and CoJ we were rudely met by blank screens when attempting to run the game benchmarks.

Whether this was a driver issue or indeed the hardware wasn't capable of running the tests was unsure, nonetheless we can't recommend this card.

SCORE **1.5** OUT OF 10

GEARBOX

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iPond Hi Fi Fish Tank

Price $69.95 **Supplier** Pets Paradise and Pet Goods Direct
Website www.petgoodsdirect.com.au

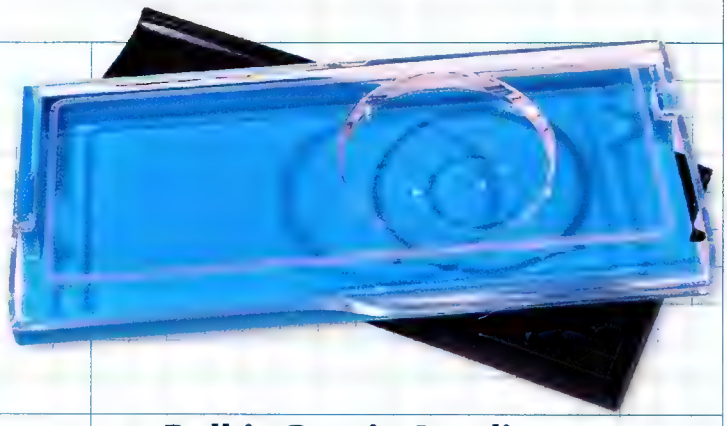
This is the most despicably evil anti-fish machine ever invented. It's supposed to be 'lifestyle technology', but it's a fish torture device! You're supposed to actually put a live fish in this tiny cramped claustrophobic box with no proper oxygenator, then plug your MP3 player in to power a built-in speaker. Water's wonderful conductivity of low frequency sound will (probably) send poor fishy completely mad within an hour! This product is a hate crime against fish! Next thing they'll release a battery chicken cage with an iPod speaker in it...

Apacer Handy Geno AH421

Price $42 **Supplier** Apacer **Website** www.apacer.com

There are times that items come along and you can't help but think 'why the heck hasn't this ever been done before?' and quite frankly, this product is one such thought-provoking device.

The reason being the unique right-angle designed USB connection. Not only that though, this nifty little device doesn't stop with one mind-f... um, mind-blowing, alternative and innovative design, it goes on to have the functionality that allows the USB connection to swivel between three positions within a 180-degree swivel – darnn cool for assuring the flash drive is sticking out, in or around about the right direction when plugged into you computer.



Belkin Power Dock AV

Price $47 **Supplier** Belkin **Website** www.belkin.com.au

The necessary cables to display video from an iPod onto a television display have been available and used for some time, however this always resulted in an all too temporary and disorderly fashion. Now to your cable management and general clean look rescue is this, the Belkin Power Dock AV.

Allowing you to connect, and stream, to a TV through an AV cable – a whole 6-feet of it – this little device also has USB connectivity, as well as AC power to assure that your video streaming and viewing pleasure isn't interrupted by the loss of power to the unit.

Belkin Remix Acrylic for iPod Nano

Price $22 **Supplier** Belkin
Website www.belkin.com.au

It's built of molded plastic, with a 'soft-touch protector' over the jog-wheel to assure that the unit's touch pad control system can still be used when the rest of the unit is cased within its plastic cage. Smart? Probably.

Honestly though, we can't see the use of such a product. If you're that scared your precious iPod will get scratched, you clearly should have thought twice about making that purchase. Regardless, we're not your shrink nor Steve Jobs, so we're not likely to make you think otherwise. *Drops iPod*

Belkin Power Pack for iPod

Price $57 Supplier Belkin Website www.belkin.com.au

So you've been bopping all day to the deplorable winner of the last Australian Idol who everyone except for you has forgotten when, shock horror, your lovely iPod runs out of battery!

Deprived of your idol and lost without their guidance, you search desperately for a means to resurrect the tunes that so many wish had never been brought into existence.

Well rest assured, that even for your sorry soul there is a solution in the form of this Belkin Power Pack for iPod. With the ability to power off of a mains power output, a powered USB port or a car's cigarette-lighter – you'll never be without your tunes again.

QNAP QBack-25

Price $66 Supplier Bluechip IT Website www.bluechipit.com.au

Constructed of lightweight brushed aluminium and plastic and accompanied by a PVC (fake leather) satchel for it to be stored in while not being used, the QNAP is a simplistic 2.5" HDD drive enclosure.

Not just an enclosure though, the QNAP QBack-25 also features a simple and effective backup utility that allows many types of backups from automatic on-connection through to scheduled.

The package contents include the enclosure, PVC satchel, USB wire, small screw driver, driver disc and manual. All that is needed to round out the package is for a 2.5" HDD to be purchased and installed in the enclosure.

Belkin TuneStage 2 for iPod

Price $186 Supplier Belkin Website www.belkin.com.au

A wicked concept and yet another fresh idea from the lads and lasses in Belkin's R&D sector, this spiffy wireless device has a range of useful attributes.

One of the coolest concepts we think drove the design and even the initial conception of this unit is that someone got really ticked off with that annoying person who always changes the music when it's playing your favourite song at your party!

With this groovy little gadget you can use the power of Bluetooth to battle these evil fiends and keep the party's playlists in your pocket, where only the special individuals can gain access.

O2 XDA Atom Life Limited Edition

Price $911 Supplier Belkin Website www.belkin.com.au

If you're feeling smart and sophisticated with a dash of tech savvy, how about giving the O2 XDA Atom Life Limited Edition a go?

Using the Microsoft Windows Mobile 6.0 operating system, processed by an Intel XScale PXA 270 at 624MHz paired with 64MB of RAM and weighing in at just 145g, the O2 XDA Atom Life is a pocket-sized powerhouse.

Featuring a well lit 2.7" 262k QVGA TFT LCD display and packed with additional smart phone features for that extra bit of functionality, the Atom Life is set to help streamline your daily activities such as planning the day, creating check lists, reminders, emails and other such tasks.

THE TACTICAL FIRST PERSON SHOOTER
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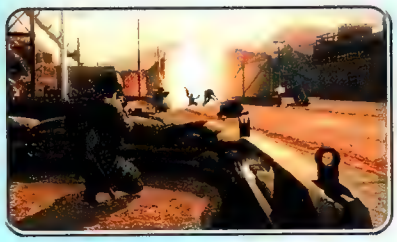


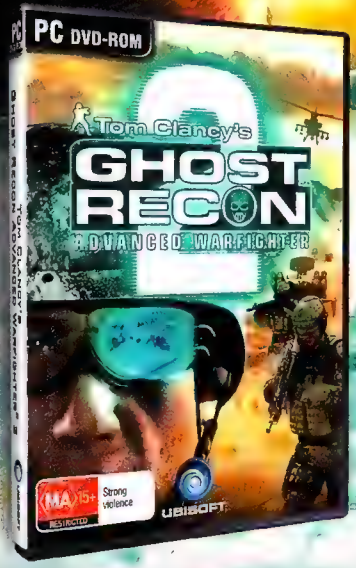
Individual order system, strategic planning phase, extended supports, specific maps, various environments.

Battle with up to 32 players in one of the 7 coop and adversarial multiplayer modes including the brand new "Recon vs Assault" mode.

Play GRAW2

atomic LIVE 2007

October 20



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TEAM Xtreem PC3-12800 C7

Josh Collins gets Xtreem with the latest Micron-based DDR3 from TEAM Group.

SPECIFICATIONS

Price $935 **Street Price** $TBA
Supplier MMT
Website www.teamgroup.com.tw
Specifications PC3-12800; DDR3-1600; 7-7-7-21 2T; 1.75V – 1.85V; Micron D9GTR-based; lifetime warranty.

TEAM Group has been at the forefront of developing performance DDR3 but, this is the first kit to be released for retail consumption.

Known for its use of Micron D9GMH and D9GKX-based ICs exclusively in its DDR2 Xtreem series, it comes as no surprise that Team GROUP has launched its DDR3 series, in particular the Xtreem range, using Micron's new Z9HWQ based-IC, which will eventually make use of the consumer-branded D9GTR IC.

Not to create confusion, the Z9 moniker is only given to the ICs used on modules under the engineer sampling process. A number of these samples also make their way into review kits. However, by the time review samples are sent to the likes of *Atomic*, the commercial sample D9 name-based ICs are in production and performance is akin to that of the Z9 ICs.

TEAM Group has arrived slightly later to the DDR3 scene than other vendors such as Kingston, Corsair and OCZ and for good reason; these brands launched their DDR3 very early using ICs from manufacturers such as Qimonda, Elpida and Samsung and as such have had limited overclocking headroom.

As a result of TEAM Group's patience it is effectively one of the first to the consumer market place – not to mention the *Atomic* labs – with true performance DDR3 modules.

Arriving with an already exceptionally drool-worthy stock specification of DDR3-1600 at 7-7-7-21 alpha latencies, we couldn't wait to get this kit benching, so bench we did.

For testing of the TEAM Xtreem DDR3-1600 kit we chose to make use of the new ASUS Blitz Extreme in place of the DDR2-based EVGA 680i SLI motherboard of our standard testing platform.

> **"Holy hell, we were amazed with the result! DDR2-2000 9-9-9-24 riding on a 500MHz FSB with a multiplier of six – this memory kit was absolutely flying!"**

With the system set up and ready to go, it became immediately obvious that it would be essential to substantially raise the FSB of our X6800 for testing of these modules due to the motherboard's divider options maxing out.

Starting with the processor clocked at 3.2GHz (400MHz x 8) and the memory set to the stock DDR3-1600 7-7-7-21 settings, we began our benchmark suite.

As expected, these modules were fast, perhaps faster then Speedy Gonzalez on crack. Even after taking into consideration the 200MHz increase in the processor frequency above our standard 3GHz, these modules excelled. Impressed and wondering what these modules had to offer, we pushed for more frequency, wanting to see what this kit could do while maintaining C7 timings.

The kit kept on giving with the processor set to 3.15GHz, riding on a 450MHz FSB with a multiplier of seven, the modules managed to achieve an exceptional DDR3-1800 7-7-7-21. With a deficit of 50MHz on the processor frequency, the module's performance still excelled, smashing past the 10,000MB/s barrier in the Everest Read result.

Moving on, we had to find the C8 and C9-based performance peaks. Not expected, though at the same time not surprising, the modules peaked at DDR3-1852 with 8-8-8-24 timings. Even with the processor frequency running almost an extra 100MHz above the maximum C7-based benchmarks, the results obtained at DDR3-1852 8-8-8-24 were similar due to the looser timings.

With the C8 frequency ceiling found, we were still curious about the max frequency at 9-9-9-24 timings. After dropping the multiplier to six, we began to ramp up the FSB to find the ceiling at these looser timings. Holy hell, we were amazed with the result! DDR2-2000 9-9-9-24 riding on a 500MHz FSB with a multiplier of six – this memory kit was absolutely flying!

Finally with the arrival of the Micron kits to the DDR3 market, it seems we've returned to low latency at high frequency With a stock rating that provides exceptional performance followed by huge overclocking headroom, if you're making the jump to DDR3 and can afford these modules, you would be insane not to get them.

	400MHz x 8; DDR3-1600, 7-7-7-21	450MHz x 7 DDR3-1800 – 7-7-7-21	500MHz x 6; DDR3-2000, 9-9-9-24	463MHz x 7; DDR3-1852, 8-8-8-24
Super Pi 4M	1min 25.828s	1min 25.093s	1min 28.469s	1min 23.281s
wPrime 32M	27.312s	27.687s	29.062s	26.926s
Everest Read	9500MB/s	10,434MB/s	10,802MB/s	10,425MB/s
Everest Write	7293MB/s	8183MB/s	7954MB/s	8439MB/s
Everest Latency	68.2ns	71.2ns	82.0ns	72.4ns

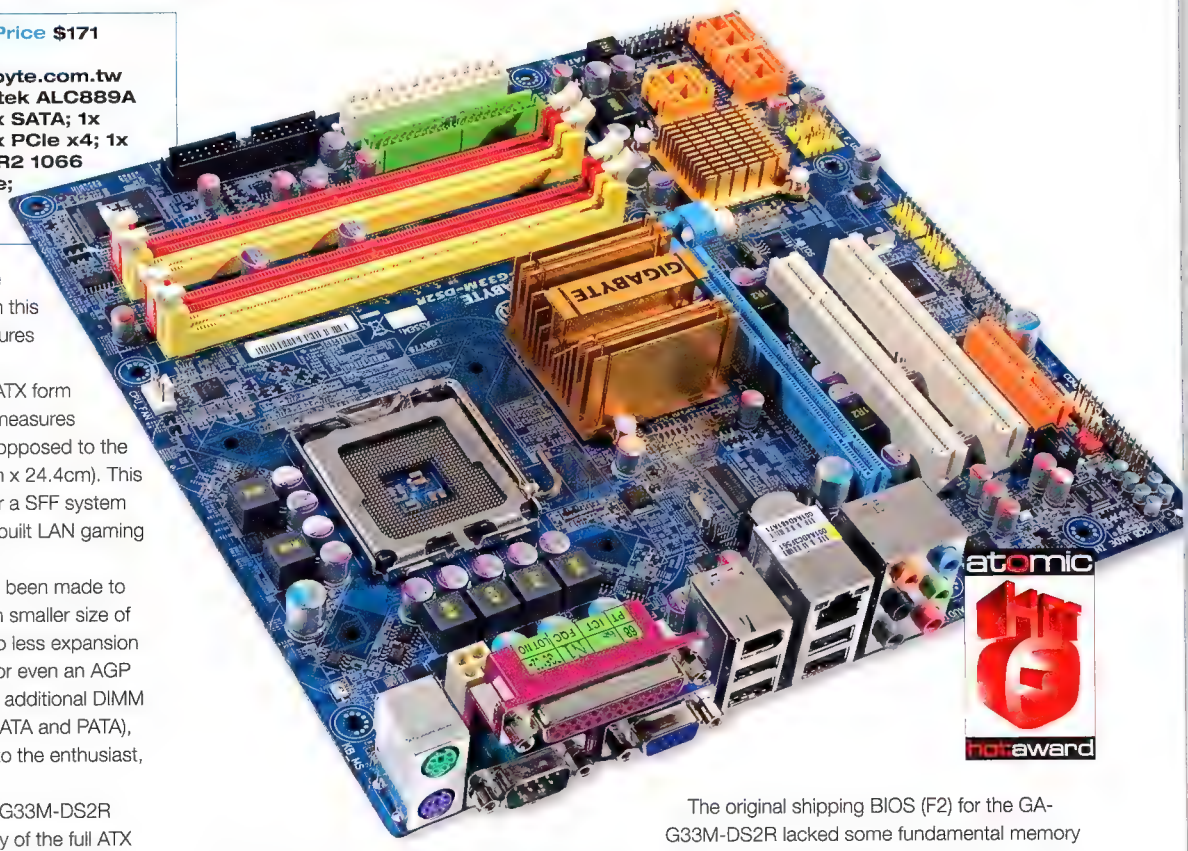
SCORE 9.0 OUT OF 10

Gigabyte GA-G33M-DS2R

Josh Collins finds performance within a rather tidy package.

SPECIFICATIONS

Price $179 **Street Price** $171
Supplier Gigabyte
Website www.gigabyte.com.tw
Specifications Realtek ALC889A 8-channel audio; 6x SATA; 1x PCIe x16; 2x PCI; 1x PCIe x4; 1x EIDE; 4x DIMM; DDR2 1066 support; 1x FireWire; 8x USB solid-state capacitors.



While the board may be small, it doesn't mean this has to be reflected in the features or performance.

Compliant with the micro-ATX form factor, the GA-G33M-DS2R measures 24.4cm x 24.4cm in size (as opposed to the full ATX form factor of 30.5cm x 24.4cm). This effectively makes it perfect for a SFF system such as a HTPC or purpose-built LAN gaming system.

In the past, sacrifices have been made to adhere to the strict and much smaller size of micro-ATX. This would lead to less expansion slots such as PCIe x16, PCI or even an AGP slot back in the day, a lack of additional DIMM slots, storage connections (SATA and PATA), and the most crucial aspect to the enthusiast, performance.

Rather stunningly, the GA-G33M-DS2R manages to incorporate many of the full ATX attributes, including four DIMM slots with dual channel support. In addition, the long-term storage connections are handled by six SATA ports and there's even an EIDE (PATA) plug.

One impressive area that the GA-G33M-DS2R covers is in the area of expansion slots. Sporting the conventional PCIe x16 slot and two PCI slots, they're accompanied by a native PCIe x4 slot – not commonly seen on ATX motherboards, let alone micro-ATX. As much as it may not be common, it's still fairly useless – these ports are generally used by dedicated RAID cards, network cards and no doubt we'll see sound cards based off of this standard in the future.

With the onboard audio taken care of by the Realtek ALC889A chip, the motherboard advertises Blu-ray and HD-DVD full-rate, lossless audio with support for 8-channel audio.

Also onboard is a VGA output for video display. This output is connected to the Intel GMA 3100; though don't expect anything magnificent from it in regards to gaming or high-def play back. We advise a discrete GPU to bypass this particular onboard video processor.

As has become standard for GIGABYTE, the GA-G33M-DS2R makes use of solid-state capacitors everywhere. It's always a welcome addition, and is most impressive on a $171 micro-ATX motherboard.

Considering that the price point of the GA-G33M-DS2R puts it in the budget sector, the features of the board speak otherwise. With this in mind, we questioned whether these were additional frills to cover for sub-par performance.

Pleasantly, the performance was comparable to that of the GA-P35-DS3R (issue 80) – the full ATX and P35-based brother of this miniature G33-based board.

The original shipping BIOS (F2) for the GA-G33M-DS2R lacked some fundamental memory dividers, the most important of which was a 1:1 ratio to allow for easier overclocking of the FSB without memory frequency constraints.

Initial testing showed great performance in FSB overclocking, though due to the need for at least PC2-10000 (DDR2-1250) capable memory to reach a 500MHz FSB. This very quickly restricted the overclocking potential of the motherboard.

Thankfully, GIGABYTE has released the F4a BIOS, which provides 1:1 and 1:2 divider settings. This effectively allowed for high FSB overclocks without memory restrictions and the capability to run high frequency memory at a stock FSB.

Armed with the now available 1:1 ratio and the usual smoking-hot *Atomic* labs test bench, we surged forward on the hunt for the max FSB.

Were we surprised! The board could take it to the full ATX big boys with a whopping 505MHz FSB. This is an absolutely mammoth achievement for a micro-ATX motherboard and completely redefines the concepts behind this form factor.

If space is an issue, you don't require huge amounts of expansion slots and want exceptional bang for you buck, it's hard not to be impressed by GIGABYTE's GA-G33M-DS2R.

	266MHz x 11; DDR2-800, 4-4-4-10 (BIOS F2)	266MHz x 11; DDR2-1066, 4-4-4-10 (BIOS F4a)	505MHz x 6; DDR2-1010, 4-4-4-10 (BIOS F4a)
3DMark06	11138	11167	11285
Super Pi 4M	1min 42.063s	1min 38.188s	1min 34.985s
wPrime 32M	30.187s	29.515s	29.187s
Everest Read	6336MB/s	7431MB/s	8397MB/s
Everest Write	4867MB/s	4825MB/s	8004MB/s
Everest Latency	80.4ns	68.7ns	63.3ns

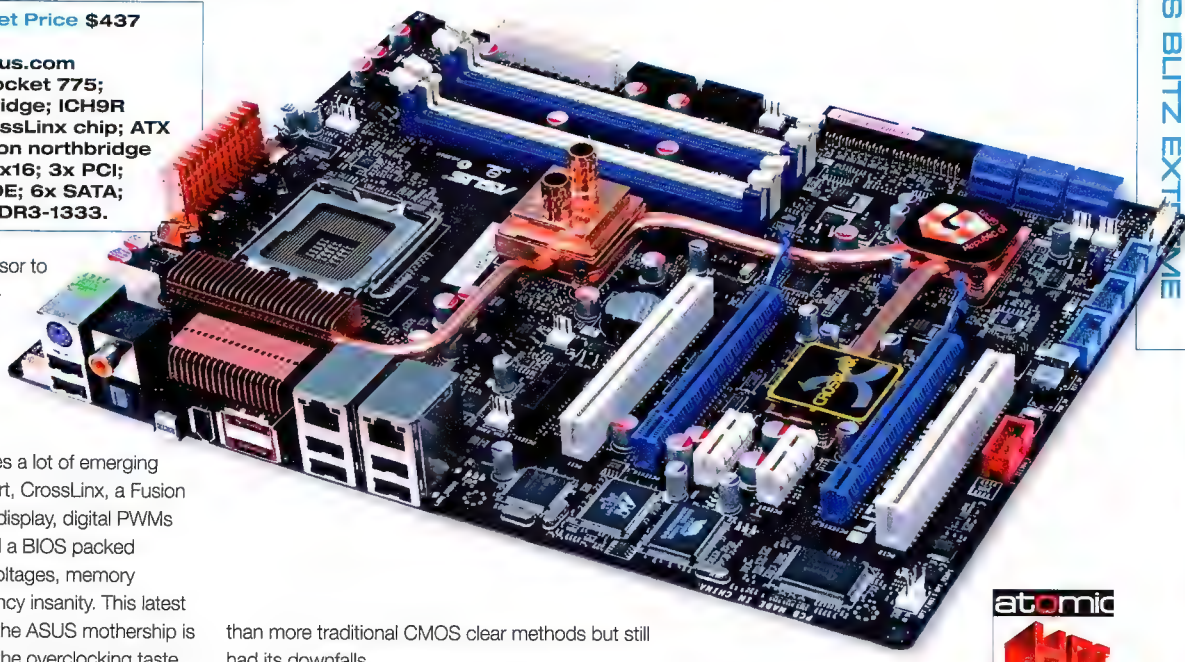
SCORE **9.0** OUT OF 10

ASUS Blitz Extreme

Josh Collins didn't think a blitz could be extreme.

SPECIFICATIONS

Price $499 **Street Price** $437
Supplier ASUS
Website www.asus.com
Specifications Socket 775; Intel P35 northbridge; ICH9R southbridge; CrossLinx chip; ATX form factor; Fusion northbridge cooling; 2x PCIe x16; 3x PCI; 1x PCIe x1; 1x EIDE; 6x SATA; 1333MHz FSB; DDR3-1333.



The conceptual successor to the exceptionally awe-some and high-performing P965-based Commando, the P35 Blitz Extreme has quite a reputation to live up to.

The Blitz Extreme features a lot of emerging tech, such as DDR3 support, CrossLinx, a Fusion Block System, LCD POST display, digital PWMs around the socket area and a BIOS packed with options for tweaking voltages, memory latencies and all-out frequency insanity. This latest motherboard offering from the ASUS mothership is set to tingle and invigorate the overclocking taste buds of many enthusiasts.

Layout-wise, the Blitz Extreme is unsurprisingly very reminiscent of the Commando. Expansion slot positioning is similar, however, two of the PCI slots have been replaced with PCIe x1, and the SATA and EIDE (PATA) ports are right-angled, so as to not be blocked by large graphics cards. Digital PWMs surround the CPU socket area, a boon to massive heatsinks.

Another feature, also found on the Commando, is the LCD POST display. This was exceptionally useful as a diagnostic tool when overclocking the Commando and remains so with the Blitz Extreme. The issue in the past was the position of the display, placed on the rear IO panel, effectively making it invisible to the average user. To remedy this, the LCD POST display is now a separate module that can be place on the user's desk, perhaps below the screen for easy reference.

Something else that's received some attention since the Commando is the onboard CMOS clear switch. Previously, for the switch to take effect a jumper had to be changed on the motherboard to first initialise the switch to an active state. From here, the power had to be switched off at the PSU and once done, the switch could be used to clear the CMOS. This was useful and more user-friendly than more traditional CMOS clear methods but still had its downfalls.

As a result, ASUS has re-engineered this feature, now placing the clear CMOS switch on the rear of the motherboard on the IO panel. Furthermore, the switch is a one-stop-clear now, rather then a three-stage process. This is a welcomed feature on the Blitz Extreme, for both test bench users and general home desktop users alike.

Built as an enthusiast motherboard and marketed as an overclocking powerhouse, it was time to check out the board's potential and make use of the additional options in the BIOS.

With the X6800 set to a 333MHz FSB and a multiplier of nine enforced, we set the memory to run at DDR3-1333 with 6-6-6-18 timings. After running through the benchmarks, gains in the results were very quickly proven from the high-frequency DDR3 with tight timings. With strong improvements seen across the board, we then pressed onwards to test the overclocking potential.

Lowering the multiplier to six, adjusting the voltages as necessary and raising the FSB frequency, we were soon quite happily benchmarking at a 500MHz FSB and running an extremely impressive memory frequency and latency set of DDR3-1666 6-6-6-18 on TEAM Group's Xtreem DDR3-1600 C7 kit. Again scoring very impressive results across the board with considerable gains in Super Pi 4M and smashing past the 10,000MB/s barrier for the Everest Read result.

Feeling there was more to be had in the system, we continued to raise the FSB frequency – the end result hurtling us into Windows on a stable 555MHz FSB. With the memory initially set to DDR3-1388 6-6-6-18 to assure no memory strain while overclocking the FSB, we ran the benchmark suite and saw the expected gains of such a high FSB. We further tweaked the memory frequency at this FSB limit so as to obtain the true potential of the system.

With the memory rockin' on at DDR3-1776 7-7-7-21 settings on a 2T command rate, the results speak for themselves as to the overall performance increases. Of special note are the exceptional Super Pi 4M gains and the breaking through of the 11,000MB/s Everest Read result with a very tasty 11,381MB/s.

Featuring a clean layout, a well-designed BIOS and exceptional overclocking potential, this motherboard truly is a welcome entry to the enthusiast market and should be on any overclocker's short list of motherboards to buy.

With DDR3 rather quickly coming of age and showing large performance gains over that of DDR2, this board would make a stable foundation for building into the future of enthusiast computing.

	333 x 9; DDR3-1333, 6-6-6-18	500 x 6; DDR3-1666, 6-6-6-18	555 x 6; DDR3-1388, 6-6-6-18	555 x 6; DDR3-1776, 7-7-7-21
3DMark06	11271	11295	11617	11625
Super Pi 4M	1min 31.718s	1min 28.329s	1min 21.781s	1min 20.532s
Everest Read	8355MB/s	10562MB/s	10083MB/s	11381MB/s
Everest Write	6096MB/s	7949MB/s	8826MB/s	8826MB/s
Everest Latency	70.8ns	82.8ns	88.7s	78.0ns

SCORE 9.5 OUT OF 10

Enermax Uber Chakra

Josh Collins gets in touch with his spiritual side.

SPECIFICATIONS

Price $190 Street Price $150
Supplier Actiontec
Website www.actiontec.com.au
Specifications 5x external 5.25" bays; 2x external 3.5" bays; 6x internal 3.5" bays; 1x front mounted 120mm blue LED fan; 1x rear 120/92/80mm fan mount; 1x multi-directional 250mm fan mounted on side panel.

A chakra is one of seven centres of spiritual energy in the human body, according to yoga philosophy. How this name associates with cases, we aren't sure.

Nonetheless, we took the opportunity to look at the new Uber Chakra from Enermax, as if it were somehow better than any chakra us paltry meatbags could offer.

The Uber Chakra has a bold style and confronting size. Measuring 216mm x 552mm x 550mm (W x H x D), the case slots into the ATX full tower category, with its largeness allowing for five external 5.25" bays, two external 3.5" bays and six internal 3.5" bays for all of your storage needs.

The fascia is a combination of a plastic frame, with metal mesh covers over the external bay as well as a mesh opening for front-mounted 120mm fan.

While on the matter of fans, the Uber Chakra offers a multitude of cooling bits. At stock, the case contains a front intake 120mm fan and a 250mm fan mounted on the side panel. Both fans have built-in blue LED lights for some subtle glowing effects. In addition to these fans, there is a provision for mounting a fan in the rear of the case. This mounting allows for either 80mm, 92mm or 120mm fans to be secured for rear exhaust.

The case offers some interesting features and tweaks to some generally ordinary features. For example, the side 250mm fan has three cycle modes. The first is an off position, the next is to spin the fan to push air into the case and the third position sets it to extract air. This switch is easily accessible from the exterior of the side panel as it is built into the bezel of the side mesh window. Another feature of this large side-mounted fan is the ability to turn the LED lighting within the fan on and off. This allows for further preferences made by the user and the ability to turn off the glittering bling of the LEDs if a situation calls for it.

Also of interest is the inclusion of an eSATA port on the front exterior IO area with the traditional USB, mic and speaker ports. We're happy to see innovations such as this and the inclusion of an easily accessible port that is quickly becoming the preferred interface for external devices, particularly portable hard drives.

To allow for easy PSU installation, the PSU retention bracket is removable, thus creating a large enough hole with which to slide a PSU into.

On the flip-side of easy installation, is the removal of the of the external drive bay covers in order to install a drive. A word to the wise: We found this extremely difficult and the process is not for those without a strong will to succeed. Once removed however, the installation of devices into the now-empty bays is quite easy. Adopting a tool-less design, as found on many cases in the market today, it's a welcomed simplicity after the initial battle with the mesh drive covers.

The internal construction is generally quite good with edges either filed or rolled to reduce any risk of cutting one's self while tinkering within. There are some minor sharp edges, though they're not generally within the areas brushed by during your average building or tweaking session and it's unlike you'll spill any of your precious virgin blood.

A singular or pair of long GPUs, such as an 8800 GTX or Ultra, fit comfortably within the enclosure with plenty of room to spare.

Overall the Enermax Uber Chakra is a competent enclosure capable of effectively housing anything from a basic system configuration to a dual-GPU, multiple-HDD or other space-hungry setup.

> **"The side 250mm fan has three cycle modes. The first is an off position, the next is to spin the fan to push air into the case and the third position sets it to extract air. The switch is also easily accessible."**

SCORE 7.5 OUT OF 10

GIGABYTE P35 Series Motherboards Featuring Ultra Durable 2 Design

Intel P35-based motherboards from GIGABYTE feature high quality, highly efficient components designed to provide maximum durability for today's high performance motherboards

Supports Intel Core 2 Quad Inside

Intel P35 EXPRESS CHIPSET

FSB1333 Support | Quad Core Optimized | CROSSFIRE

GIGABYTE Ultra Durable 2

In 2006, GIGABYTE launched their Ultra Durable series of motherboards, setting the industry standard by being the first motherboard maker to employ All-Solid Capacitors on a wide range of top-to-bottom products. This year, GIGABYTE is setting a new industry standard with their Ultra Durable 2 Series motherboards, featuring Low RDS(on) MOSFETS, Ferrite Core Chokes and All-Solid Capacitors for their upcoming Intel P35 motherboards. So, what do these new components do and what are their benefits?

Using high quality components on a motherboard is the key factor for having a long lasting, stable and reliable product. This is especially the case for the power circuit design, which features the most critical components of a motherboard.

Quality Components make Quality Motherboards

1. Low RDS(on) MOSFET
2. Ferrite Core Chokes
3. Solid Capacitors

Ultra Durable 2 (without heat pipe)

CPU zone temperature test

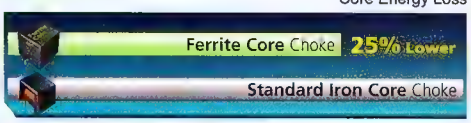
Ultra Cooling

Low RDS(on) MOSFET Design

A MOSFET (Metal Oxide Semiconductor Field Effect Transistor) is a switch that allows or stops electric current to pass through an electric circuit. If the CPU is requesting power, the MOSFET acts as an "on" switch and allows the power to travel through the power circuit. If the power circuit is in a discharge state, the MOSFET will then act as an "off" switch, stopping the current so the circuit can discharge the power in the system before additional current is allowed to pass through.

GIGABYTE Ultra Durable 2 motherboards utilize Low RDS(on) MOSFETs. These differ from regular MOSFETS in that they are specially designed to produce lower switching resistance and utilize lower power consumption. The result is faster electric current charging and discharging and less heat generation.

Low Power Loss



Ferrite Core Choke Design

If the MOSFET is in the "on" state, the current will then flow to the choke. A choke is an inductor that stores energy and allows Direct Current (DC) to pass through while blocking Alternating Current (AC). Choke coils help to prevent electromagnetic interference (EMI) and radio frequency interference (RFI) from the power supply from interfering with the power circuit.

Instead of using regular chokes, GIGABYTE Ultra Durable 2 motherboards feature Ferrite chokes that are comprised of a compound of iron-oxide and other metal elements. These metal properties hold energy much longer than common iron-core chokes at high frequency, resulting in lower power loss.

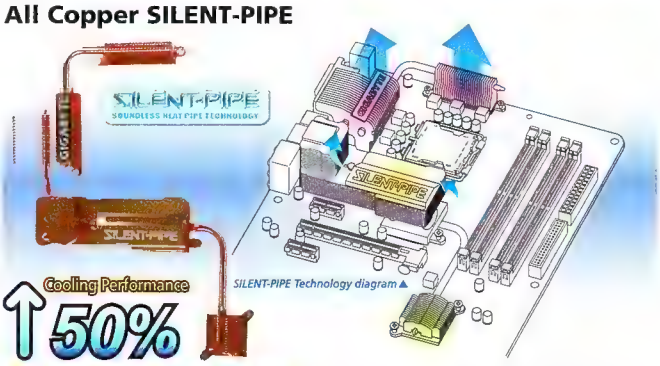
Longer Life

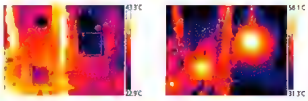
All-Solid Capacitors Design

From the choke, the current then passes through a capacitor. The capacitor stores electricity and delivers it to the component requiring power such as the CPU.

GIGABYTE uses Japanese manufactured solid capacitors to deliver maximum stability, reliability and longer system lifetime for general PC usage as well as for improved overclocking performance.

All Copper SILENT-PIPE





With SILENT PIPE | Without SILENT-PIPE

The GIGABYTE P35 Series also feature the all new copper GIGABYTE SILENT-PIPE thermal solution* covering the north bridge, south bridge and CPU power MOSFETs. This new design helps to dramatically reducing the general CPU zone temperature. In fact, the new GIGABYTE SILENT-PIPE enhances cooling performance up to 50%

GIGABYTE P35 Series

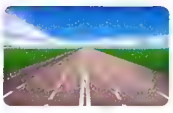
The next generation platform for 45nm Intel® Multi-Core Processors

Without a doubt, the GIGABYTE P35 Series deliver the very latest in high performance computing. Providing exceptionally high levels of overclocking performance, the GIGABYTE P35 Series features the Intel P35 chipset, with optimized system memory capabilities and chipset overspeed protection removed. Additionally, the GIGABYTE P35 Series supports the latest multi-core processors up to FSB 1333MHz, including the upcoming 45nm platform, with its record breaking performance and greater energy efficiency.

The GIGABYTE P35 Series offer options for both DDR2 1066 and DDR3 1333 memory support*, providing scalable options for users wanting to take advantage of higher memory performance with less power consumption to run next generation applications such as high-definition video and 3D visualization.

DDR3 1333 DDR2 1066

The GIGABYTE P35 Series also includes options for those wanting ATI CrossFire™ support*, providing dual PCI Express connectivity for high performance, high-definition entertainment platforms.



ALC889A with DTS Connect Excellent Audio Performance

The GIGABYTE P35 Series also feature the Realtek ALC889A equipped with a high-performance DAC (Digital-Analog Converter) with 106 dB Signal-to-Noise ratio playback quality, designed especially for Windows Vista Premium PCs.

Blu-ray/HD DVD Full Rate Audio Support

Blu-ray/HD DVD Full Rate Lossless Audio

The ALC889A also enables high quality Full Rate Lossless Audio for content protected media and support for both Blu-ray and HD DVD formats for an exhilarating home theater entertainment experience.

7.1+2 Channel High Definition Output

The ALC889A provides support for 7.1 sound playback, plus 2 channels of independent stereo output (multiple streaming) through the front panel stereo outputs.

dts Connect

For DQ6/DS4 Series Models

*GA-P35T-DQ6,GA-P35T-DS4,GA-P35-DQ6 and GA-P35-DS4 feature the GIGABYTE SILENT-PIPE thermal solution

*The GA-P35T-DQ6 and the GA-P35T-DS4 support Dual Channel DDR3 memory, while the GA-P35C-DS3R supports DDR2 or DDR3 memory for flexible scalability

*The GA-P35-DQ6, GA-P35T-DQ6, GA-P35-DS4, GA-P35T-DS4 and GA-P35-DS3P feature ATI CrossFire™ support

For more information on the GIGABYTE P35 Series and GIGABYTE Ultra Durable 2, please visit the GIGABYTE website at:

http://www.gigabyte.com.tw/Products/Motherboard/Default.aspx

GIGABYTE™

Hiper Type-R MKII 770W

SPECS

Price $TBA **Street Price** $TBA
Supplier Arena PC
Website www.arenapc.com.au
Specifications ATX 12V 2.2 EPS12V V2.91-compliant; RoHS compliant; three-year warranty; 4x USB ports; 1x mobile device charger.

RoHS compliant, NVIDIA SLI certified, 80%+ efficiency, active PFC and conforming to the ATX12V v2.2 and EPS12V v2.91 form factors, this power supply checks the boxes of all the necessary current standards.

The casing of the Type-R MKII 770 has enough bling to make Flava Flav feel dull, while the cabling is so suave with its neatly sleeved braiding that it could make James Bond feel out of place. Add to this the four built-in USB connections and single mobile device connection (i.e. mobile phone) and the Type-R MKII 770 is pretty complete as far as PSUs go – and then some.

The USB ports are connected to the motherboard via a USB header cable. When plugged, the PSU provides four external ports.

What's also useful is that the USB ports, as well as the mobile device connection, remain powered when the unit is not juicing the system. This is perfect for those of us who require the ports to charge devices such as mobile phones, PDAs, MP3 players or any other gadget.

The chassis and general design of the Type-R MKII 770 is a radical flip on the original Type-R 730 design – or rather, it's a return to the norm from the previous radical design. Once having played host to a chassis that turned heads, as well as hurt many brains as they pondered how to fit it in their case, the MKII revision hails a return to the less-confusing.

Cooled by a single 80mm fan, the unit is surprisingly quiet. It's audible, but the sound is not obnoxious and would be easily drowned out by the likes of CPU and GPU air coolers.

In the performance stakes, the Type-R MKII 770 shows promise with the 12V, 5V and 3.3V rails all returning strong results during testing.

With an average output of 770W, a peak output of 980W and a tasty selection of features, the Hiper Type-R MKII 770 is in fine form to provide the power needed for enthusiast's computers. **JC**

SCORE 8.0 OUT OF 10

Patriot PC2-9600 C5

SPECS

Price TBA **Street Price** $433
Supplier Australia IT
Website www.australiait.com.au
Specifications PC2-9600; DDR2-1200; 5-5-5-12 2T; 2.3V; Micron D9-based; lifetime warranty.

atomic hotaward

The general consensus for PC2-9600 memory is to employ alpha timings of 5-5-5-15 at a 2T command rate, on occasions using even looser latencies. Patriot differentiates itself by providing a stock specified kit with alpha timings of 5-5-5-12 at a 2T command rate. This straightaway adds weight to the fact that the chips used are from the top level of the binning process.

Due to this initial impression, we were keen to see what these modules could do.

With the processor set to a 333MHz FSB with a 9x multiplier, we set the memory in unlinked mode and manually forced DDR2-1200 5-5-5-12 2T.

The Patriot PC2-9600 C5 kit benched comfortably at their stock settings. In return the modules gave the expected stellar results as would be customary of a kit of memory at this frequency and timings.

Wondering how many more megahertz we could get while maintaining the 5-5-5-12 timings and 2T command rate, we extended the frequency to DDR2-1250 – the same stock frequency of the Corsair Dominator PC2-10000 kit. Again the modules benched comfortably.

Onwards we pushed though it seemed the modules had gotten just too comfortable – there was nothing to be had above DDR2-1250.

After having experienced the ease at which these modules maintained DDR2-1250, it was time to see what C4 timings could do.

Setting the modules to 4-4-4-12, we began to raise the memory frequency. We grinned happily as the modules strolled over and above DDR2-1000, as would be expected of Micron D9-based modules. Expecting to experience hiccups around DDR2-1050, we were pleasantly greeted by a maximum frequency of DDR2-1185 at 4-4-4-12 2T!

With the Super Pi 4M result lacking slightly we tightened the RAS# to RAS# Delay (tRRD) to 4, from 5, and the Row Refresh Cycle time (tRC) from 30 to 25. These changes greatly increased the performance of the modules at C4 latencies and shaved a whopping 1.453s off of Super Pi 4M.

Topping out at an impressive DDR2-909 at 3-3-3-8 with a 2T command rate, these modules proved to be very comfortable with low latencies and high frequencies – especially at C4.

With Patriot making moves into the Australian market over the following months, along with a number of other overseas manufacturers, this is very welcome competition in the Australian DDR2 scene. **JC**

SCORE 9.0 OUT OF 10

OCZ POWER SUPPLIES

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OCZ...Bringing Individuals and Power Together. There is an OCZ power supply for everyone. Today's systems feature vast performance capabilities that require rock-solid, reliable power whether you are running servers, quad-GPUs, or overclocked platforms. OCZ's diverse lineup of premium power supplies has something for everyone with configurations ranging from 600W to 1010W. Check out ocztechnology.com and get on your way to finding the perfect power match for all your computing needs.

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Lidcombe NSW 2141
Australia
Tel: +61 2 9643 1388
Fax: +61 2 9643 1488

MSI NX8600GTS Diamond Plus

SPECS

Price $TBA **Street Price** $272
Supplier MSI
Website www.msi.com.tw
Specifications 675MHz core; 2000MHz memory; 256MB GDDR3; 1x HDMI output; 1x dual-link DVI; TV-out.

With the 8800 series of GPUs from NVIDIA commanding the top-end with considerable coverage compared to the HD2900XT, it appears that AMD ATI has turned its attention to the more budget-orientated market.

In said market, one can find this little gem, the MSI NX8600GTS Diamond Plus. True treasure or cubic zirconia? We had to know.

After running 3DMark06, it's evident that the mid-to-low range 8-series is not heavily gaming-orientated, unlike its more expensive but market-leading 8800 brethren. Scoring a result of 5726 3DMarks, it's a good thing that this graphics card has other more homely features to help sell it.

By homely, we're referring to the features ideal for a home theatre PC, or as it's most commonly referred to these days, a HTPC. The most ideal of these features being HDMI, which this card conveniently includes. Unfortunately, we did find some problems with implementing the card in this environment.

The first of these flaws is the inability to stream audio over the HDMI output, unlike the ATI competition that can. While the card may have a native HDMI port, the ATI alternative is better for those wanting full-spec HDMI output.

An additional oversight is the cooling hardware utilised by MSI on the card. One would generally be fairly safe to assume that it would be a quiet bit of kit. What we actually have isn't quite akin to a monkey vocally expressing its annoyance at being restrained from its banana, but the card is louder than the reference heatsink found on the AMD ATI HD2600XT. Add to this the fact that it is a dual-slot card and it is another strike against it in the HTPC sector, where space is generally at a minimum.

A valiant effort by MSI and NVIDIA, and a step in the right direction, but at this stage, we see the HD2600XT-based cards being the better alternatives for the HTPC builder. **JC**

SCORE 7.0 OUT OF 10

Tagan 2-Force II 900W

SPECS

Price $339 **Street Price** $TBA
Supplier Actiontec
Website www.actiontec.com.au
Specifications ATX12V 2.2/EPS12V 2.9 24-pin ATX; ATX12V 4-pin; 2x 8-pin (6+2 design) PCIe; 2x 6-pin PCIe; 2x 7x 4-pin; 8x SATA.

Taking a close look at the Tagan 2-Force II 900W, you could easily mistake it for a 450W PSU purely thanks to the size of the unit. Measuring in at 16cm of depth, this is a compact unit when compared to others with similar wattage output.

The PSU features six 12V rails in its design, with a maximum output of 20A across each rail and a maximum combined output of 70A across the 12V rails, which equates to 840W of power. With a maximum total wattage output of 900W, the unit is clearly designed with the power user and enthusiast in mind.

To test, we configured a system consisting of an ASUS L1N64-SLI WS motherboard, packed with a pair of AMD FX-74 processors rated at 3GHz each, 4GB of memory, an 8800 GTX, followed by a Western Digital 750GB WD7500AAKS hard drive.

While testing this unit, we had a sense of 'almost but not quite' when it came to obtaining, and maintaining, standard spec voltages. With the 12V rail holding out at 11.904V, the 5V scoring 4.999V and the 3.3V hitting 3.296V.

Nonetheless, these ever-so-slightly under-par readings are within the ATX12V specification and although they're not strictly hitting the necessary voltages, such as the Hiper Type-R MKII 770W did, it is not yet at a level that would trigger alarm bells.

The Tagan 2-Force II 900W unit offers completely sleeved cabling to help aid airflow and general tidiness within the case. The four PCIe power connectors are particularly nice, being covered by a smooth and flexible plastic coating over the braided sleeving, moving away from the traditional bare-braided sleeves found on the rest of the cables on this unit, as well as other PSUs.

Overall, the Tagan offers a compact design with a high output, however for those looking for a PSU within the excessively high wattage market, we advise towards a single rail, high amperage PSU. **JC**

SCORE 7.0 OUT OF 10

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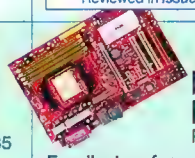
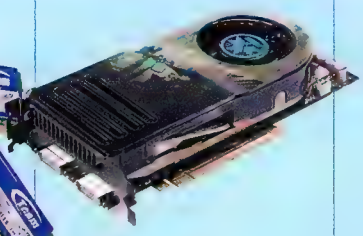
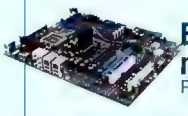
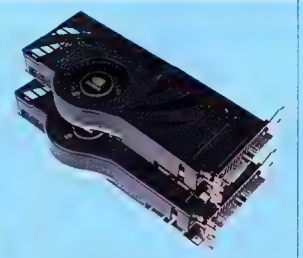
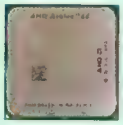
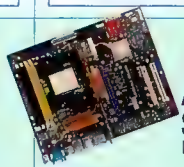
There's nothing sexier than new kit. And whether you need to horde your pennies (Budget), want the most power for your dollar (Performance) or own a small mansion and a collection of sports cars (Extreme), we're here to help with this handy matrix of *Atomic* recommended products. You may find your needs fall between categories – that's okay, just mix and match to suit your budget! Each piece of kit has been reviewed hands-on in *Atomic*, so if you want to learn more, look up the issue and page number listed.

	CPUs	Motherboards	Memory	Video cards
BUDGET *I can't afford to eat... gimme gear!*	**intel**	**ASRock Conroe 945G-DVI** PRICE $113 ASRock's budget board may be using old technology, but it runs the new stuff just fine, and can even overclock a little. Reviewed in *Issue 70 – Page 60*	**Corsair Twin2X 1024MB 6400 Pro** PRICE $198 Corsair has a history of providing nice, stable and fiesty sticks of random access memory joy. These RAM sticks are EPP compliant, have low latency and are nicely overclockable. 800MHz of fun for everyone! Reviewed in *Issue 69 – Page 51*	**Powercolor X1950 Pro** PRICE $245 The X1950 Pro is nothing short of fantastic. Mind you, this could just as easily be the 7950GT, so watch this space in case the NVIDIA card drops in price. Reviewed in *Issue 71 – Page 47*
	AMD **AMD Athlon 64 AM2 X2** PRICE $135-335 Cheap CPUs are a wonderful thing, and the X2s are now wonderfully cheap. The 3600+ is your budget baby at about $85.	 **MSI K9N Neo F** PRICE $113 Excellent performance from a budget board, with plenty of legacy slots for upgraders. Don't expect to overclock though. Reviewed in *Issue 68 – Page 33*		
PERFORMANCE *Hardware that bangs the best for buck.*	**intel** **Intel Core 2 Quad** PRICE $300-680 Core 2 Quad – a processing powerhouse, now affordable and overclockable like buggery. The Q6600 is the best buy, at about $336.	**Gigabyte GA-P35-DS3R** PRICE $200 The P35-DS3R is a cheap overclocker that can't be ignored. Buy a Core 2 Quad Q6600 and go nuts! Reviewed in *Issue 80 – Page 55*	**TEAM Xtreem Dark PC2-6400 C4** PRICE $289 Cheap, overclockable and good lookin' to boot. The modules fill the void that was previously left between cheap value RAMand enthusiast overclocking kits. Reviewed in *Issue 80 – Page 56*	 **GeForce 8800GTS 320MB** PRICE $410 DirectX 10 for the mainstream. 320MB is as good as 640MB in most situations – opt for the 640MB if you're going to play above 1600x1200. Reviewed in *Issue 76 – Page 58*
	AMD **AMD Athlon 64 AM2 X2** PRICE $135-335 The X2 series are still fantastic chips, and in the face of the Intel threat are now going for cheap. The 6000+ is your current sweet spot at about $235.	**Gigabyte GA-M59SLI-S5** PRICE $250 Gigabyte delivers yet another affordable, feature-filled wonder of the 21st century. Reviewed in *Issue 66 – Page 39*		
EXTREME *Gimme power. Money is no object.*	**intel** **Intel Core 2 Extreme QX6850** PRICE $1478 Extremely powerful and a strong overclocker to boot. The G0 stepping is truly drool worthy. Reviewed in *Issue 80 – Page 52*	 **EVGA nForce 680i** PRICE $435 Stupidly over-featured and fast, if you've got the cash, then plonk it down here. Reviewed in *Issue 72 – Page 47*	**Corsair Dominator Twin2X 10,000** PRICE $1016 Crazy speed sticks that will also happily do 1T/800MHz/3-3-3-3. Comes with a fan attachment to keep things cool! Reviewed in *Issue 77 – Page 58*	 **XFX GeForce 8800GTX Ultra XXX Edition SLI** PRICE $1459x2 This is far and away the most powerful graphics card on the market, but be willing to sacrifice your entire retirement fund for the privilege of having one of these tearing up your screen. Reviewed in *Issue 78 – Page 59*
	AMD  **AMD Athlon 64 FX-62** PRICE $1072 Sadly gets beaten by a mid range Core 2 Duo, but still the top of AMD's pile. Reviewed in *Issue 66 – Page 39*	 **ASUS M2N32 SLI Deluxe** PRICE $290 Perfection in a motherboard. Beautifully laid out and overclockable to boot. Reviewed in *Issue 68 – Page 35*		

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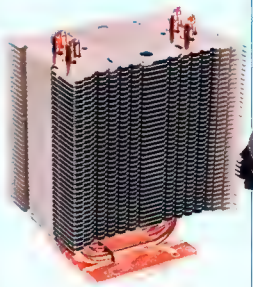
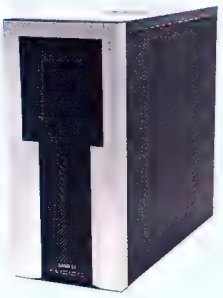
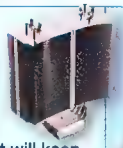
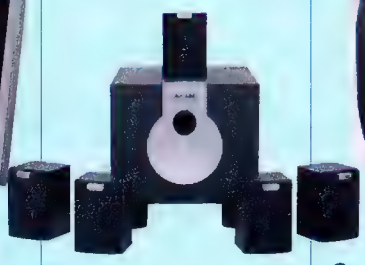
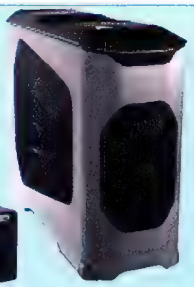
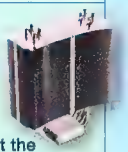
				
Noctua NH-U9F PRICE $80 It may only be 90mm, but its cooling power is exemplary, coming in only slightly behind its 120mm brother. Reviewed in *Issue 72 – Page 42*	**Samsung HD160JJ 160GB** PRICE $80 Super quiet and yet still fast, the 160GB Samsung offers excellent value for money. Reviewed in *Issue 69 – Page 40*	**Samsung 931C** PRICE $405 2ms of raging colour gamuts and beautifully smooth tonality that will make you weep with joy and hug strangers. Reviewed in *Issue 70 – Page 56*	**Steelsound 5Hv2** PRICE $120 Awesome gaming audio performance on a shoestring budget. Phenomenal 'phones. Reviewed in *Issue 73 – Page 43*	**Lian Li PC-7S** PRICE $138 Quality, elegance, refinement and style. The trademarks of a Lian Li case, now available at an entry-level price. Reviewed in *Issue 79 – Page 46*
 **Thermalright Ultra 120** PRICE $75 Tower cooling that will keep your tower cool. Whack a Nexus 120mm fan on for near silent cooling. Reviewed in *Issue 72 – Page 42*				
 **Thermalright Ultra 120** PRICE $85 Make sure you get the optional AM2 bracket (hence the higher price). Grab that same Nexus fan. Reviewed in *Issue 72 – Page 42*	**Seagate Barracuda 7200.10 320GB** PRICE $130 Seagate's fancy new technology makes this beast both fat and fast. Mmm, toasty. Reviewed in *Issue 69 – Page 40*	**Samsung 244T** PRICE $1477 Brilliance at 24", the 244T offers 6ms gaming, a wonderful gamut and more inputs than an alien hooker. Reviewed in *Issue 69 – Page 48*	**AVLabs AVL325** PRICE $165 While it can't hold a candle to the Z-5500D, with a price this low there's no excuse not to jump to 5.1. Reviewed in *Issue 64 – Page 50*	**Cooler Master Stacker 830** PRICE $290 Like the Stacker before it, this sensational Stacker stacks sumptuous specifications salaciously. Reviewed in *Issue 61 – Page 36*
 Asetek Vapochill Lightspeed PRICE $1020 Vapour phase change. Ooooh. Vapour. Phase. Change. No matter how many times you say it, it's still cool (pun!) Reviewed in *Issue 64 – Page 38*				
 Cool-Trek Vostok PRICE $199 Until more extreme cooling systems come along that are AM2 compatible, this little kit will have to fill the gap. Make sure you get the updated mounting kit. Reviewed in *Issue 68 – Page 41*	**Western Digital Raptor WD1500ADFD** PRICE $330x2 Dear lord. The performance king hath cometh, short of whacking in a SCSI. Buy two and RAID 'em. Reviewed in *Issue 62 – Page 40*	**Hewlett Packard LP3065** PRICE $2718 Thirty inches, 2560 x 1600, 8ms G2G. If you can handle the size and cost to run this massive beauty, you won't be disappointed. Reviewed in *Issue 76 – Page 53*	**Logitech Z-5500D** PRICE $430 Able to play the 'liquid gold' that is DTS 96KHz/24-bit, this 5.1 beast can wreck both home and hearing alike with equal impunity. Reviewed in *Issue 48 – Page 56*	**Silverstone TJ07** PRICE $420 The Silverstone Temjin TJ07 is a huge hulking beast that shows you mean business in the finest style. Impeccable finish and plenty of room means win. Reviewed in *Issue 65 – Page 49*

GROUNDZERO

Dan talks tech like you've never hear before

I'm ready for my upgrade

Daniel Rutter can rebuild himself. He has the technology.

I think we're all agreed that body upgrades are – or will be – a good thing, yes? Science fiction's just rotten with 'em, from Strogg-ish combat cyborgs through to anarchic utopias populated by pansexual people with wings and tentacles.

Thus far, all the 'transhumanist' movement has actually *produced*, if you don't count zillions of words of variously plausible literature, is a few freaky-deaky individuals covered with ugly hardware and a lot of heavy stimulant users hanging around Burning Man.

But that's going to change. Already, passive prostheses are allowing amputees to run faster than organic-legged athletes. Cochlear implants are commonplace; retinal implants are starting out. Not much of the add-on hardware can beat an ordinary human at anything yet, but the first cars couldn't outrun a horse, either.

More subtly, gene therapy – rewriting the DNA in living cells – is slowly getting off the ground.

There's a rare genetic condition in which an animal doesn't make any myostatin, the muscle-growth-limiting factor. In mammals, there are two copies of the myostatin-producing gene; if both of them are inactive, the result is a 'double-muscled' animal. A couple of kinds of cattle have been deliberately bred with the double-muscled condition. They all look like the Hulk. Muscles on muscles on muscles, near-zero body fat. No exercise required.

> "Super resolution monitors that let you read a newspaper 10 metres away but drive you crazy."

The double-muscled mutation occasionally occurs in humans, but almost all of the humans who had it probably starved to death before their first birthday. That's because double muscles *massively* increase your need for food.

If food isn't a problem for you, though – and it isn't, for most people living in affluent countries today – the double-muscle mutation doesn't appear to have much of a downside for humans. Provided you don't mind looking as if Simon Bisley painted you.

The second someone manages to make a double-muscle gene therapy, the world will beat a path to their door.

A significant proportion of the people knocking on that door, of course, will be there to serve legal papers. Gene therapy like this would constitute a sort of postpartum eugenics program. Anybody with enough money could, in theory, turn their kids into whatever their Glorious Aryan Leader or nutty religious cult ordered. The already wide gulf between the well-doctored Beautiful People and the Poor and Ugly could become a chasm.

Oh, and someone's absolutely certain to try to use gene therapy to create an army of super-soldiers. Us sci-fi fans know how that *always* turns out, but they probably won't listen to us.

Personally, I'm looking forward to the horrifying hilarity of the body-upgrade equivalent of today's car tuning scene. A large proportion of the world's 'upgraded' cars are actually slower around a track than they were in stock trim, and I imagine the same is likely to happen when Dr Nick Riviera opens I Can't Believe It's A Gene Therapy Clinic.

Upgraded muscles with a stock-spec heart, resulting in loss of consciousness if you try to lift anything. Super-resolution retinas that let you read a newspaper 10 metres away but drive you crazy when you look at a TV (all those tiny RGB dots!).

Cirrhosis-proof livers that let you drink like a fish with impunity – but give you a non-stop adrenaline rush if you stop. Eidetic memory, only $999*! (*We accept no responsibility when you get 'The Chicken Dance' stuck in your head for seven months and then jump in front of a bus.)

I'm also not entirely sure I want to know what you'll look like half-way through your course of Uncle Mary's Inside 'n' Out Sex Change Pills. Done properly, though, body upgrades will let people live longer (possibly *much* longer), do more, and feel better while they're doing it.

And, with any luck, as many variants of humans as there are of dogs will confuse the world's racists to death.

Augment Dan's inbox with a prosthetically-enhanced message with double the muscle.
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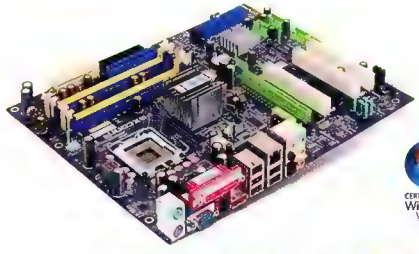

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GAMEPLAY

GAMES, GAMING AND GAMERS COVERED ATOMIC-STYLE

System Shock 2 just about had it all – mutant cyborgs, a selection of cool guns, strange and wonderful preternatural powers and a menacing incorporeal nemesis that toyed with your psyche.

The only thing it didn't have was money, hence why its developer, Looking Glass, went out of business. BioShock, made by a bunch of the same guys, looks like it will correct the mistake of its spiritual successor. We gave it a good playing, we did, on page 72.

For the more historically-minded rods and cones in your eyes, Alex Gambotto-Burke has a great piece on the evolution of audio in games. It starts on page 68, and is well worth your attention.

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Engine Room: Evolution of game audio 68
Alexander Gambotto-Burke chases down the top blokes in gaming audio. Read in awe how big an influence music and sound has on your playing experience.

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Win one of three Sound Blaster X-Fi Xtreme Audio Notebook cards!

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When it comes playing audio on PCs, your notebook usually isn't the first place you go. In fact, it's probably the very last device you'd use to pump out tunes, just below the peel of a piece of fruit and any instrument being played by *Good Charlotte*.

Not so with Creative's Sound Blaster X-Fi Xtreme Audio card. Just slip it into a free ExpressCard slot on your laptop and you'll be on your way to music heaven. To be in the draw, hit the competitions URL above and answer the question you find there.

PLAYING BY EAR

Alexander Gambotto-Burke quizzes the top game music maestros to find out how the magic is created.

Chances are, you don't pay much attention to what's coming out of the speakers when you're playing a game, unless it has something to do with gunfire, monster growls, or that bit in God of War where the camera pans off and you're left to imagine what in Zeus' name Kratos was doing with those servant girls.

This is primarily because, on the whole, the other stuff you're hearing – the music, in other words – is, at worst, garbage, and, at best, uninspired. With the games industry increasingly directing its efforts towards the visual front, music seems to be fairly low on developers' to-do lists. As such, you're far more likely to hear Generic_Industrial_Dirge_001 than anything approaching an interesting score.

That said, Jeremy Soule, one of the most prolific composers of videogame music and the man behind the sublime Morrowind score, thinks this is changing.

'It's really turning around,' he argues. 'Music is extremely complex – it's a science, it's an art, it's production, and it's a means of actually promoting videogames. With Directsong [Soule's online game music store], we've been raising awareness for videogame soundtracks. With Guild Wars, we have the second-most-successful online videogame in the world by some measurements, and Directsong was there from the start, and many of the game's userbase are avid fans of the music.'

Michael Z. Land, creator of LucasArts' legendary iMUSE system for crafting dynamic, reactive music in adventure games, agrees. 'You know,' he says, 'with the work Tommy's doing with G.A.M.E., music is becoming less and less underappreciated in the games industry. I think there's been a lot of great work to bring the profile of games music up to a much more film-like level. And his videogames live shows, with an orchestra playing game music, definitely help. I've actually participated in it a couple of times, and it's really fun. There are a lot of fans out there who follow game music, too. That community is getting more coherent and visible all the time.'

Indeed, the success of the G.A.M.E. and Play festivals are clear indicators that there is a community out there who genuinely take notice of what they're hearing when huffing through the latest, normal-mapped smoky undead crypt; Soule has found himself with celebrity status when attending them. 'I certainly see a lot of appreciation when I go to the Play concerts,' he laughs. 'I was just at one in San Jose and I

literally wore out my hand signing autographs to people who were so enthusiastic about my music, and music in general.'

Videogame music can mean a lot to players – it has, after all, scored some of their favourite interactive experiences. But there's probably another reason why Soule and Co. receive so much acclaim: making music work with games is far from easy. Working in any other medium, composers only have to worry about the integrity of their score as it's played out over time. Games demand that their precious pieces suit exactly where a player is, what he's doing, and how he's doing it. And the more open-ended games are, the more unwieldy the process becomes.

If you need more evidence, look no further than LucasArts' SCUMM engine-based adventure games. All but the earliest featured music – through the iMUSE system - would increase and decrease in urgency and intensity, depending on what a player was doing in any given scene. The 'tracks' blended seamlessly into each other, making each LucasArts game appear to tailor its score precisely to the individual player's needs. Land explains how iMUSE first came into being.

'Well,' he recalls, 'that came originally out of the work we'd done on the first Monkey Island, and there were a lot of ideas that came up for what we wanted to do with interactivity and music – like, you know, with swordfighting and stuff – that was very difficult to do with the early sound drivers, and so forth. For Monkey Island II, we resolved that we'd be able to do more interactivity, and right about that time, it came into vogue to sort of paint the game with music, wall-to-wall.'

Given the technological limitations of the time, not to mention the challenges involved in composing multiple pieces of music that had to blend into each other at any given moment, this wasn't easy. 'Interactivity is a very difficult challenge,' he continues, 'because there are so many possibilities. And, of course, music has a certain linear foundation to it, so reconciling those two is very difficult. The hardest part was debugging. You know, in theory, you create this engine, and then you put it in a game, and then all these cases come up, and all these issues come up, and that makes you have to tie it into knots just to get the job done. That's where there are the most issues to work through.'

Ultimately, though, Land and Peter McConnell's work paid off – LucasArts' games were significantly more immersive thanks to the scores that seemed to follow the player wherever he went. Land couldn't agree more. 'I think that as much as possible,' he says, 'what we hoped it would do was contribute a kind of subconscious immersion. In other words, without really trying to draw attention to itself, we wanted to draw the player into the interactivity and feel as though they were interacting with the music; that the music was scoring their individual experience.'

Above Guybrush really loves his sea shanties.
Below Can't be a god of war without some violent tunes.

Unfortunately, systems in the iMUSE vein are rarely explored with modern, big-budget game development. Land believes this comes down to the complexity of his **project; as game development budgets soar, innovative music solutions aren't really feasible. 'I think it's mainly because it's very difficult,' he concedes. 'There's a different evolution of game music, where Hollywood production values have affected how music's made. Where we tried to be interactive, the newer approach is to say, "Music has got to be linear and not particularly interactive, but, boy, is the orchestra going to**

Above **Will we be seeing Fight Fight Revolution in the future?**
Below **Sneaking usually requires silence, but in Splinter Cell it makes the atmosphere.**

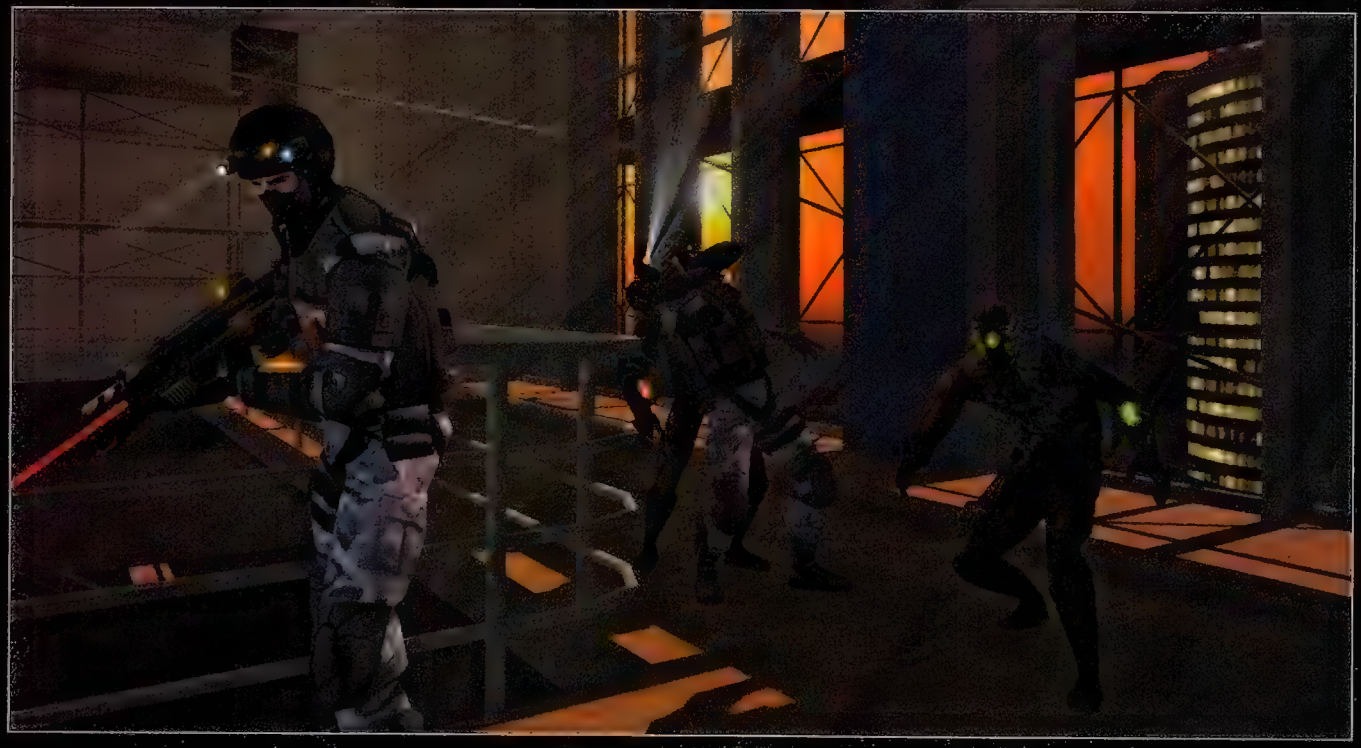
sound great." So, it's a different way of hitting the player's emotions. But ultimately, I don't think the two approaches are actually mutually exclusive. It's just obvious that in the evolution of videogame music, production values would naturally go up. And then, I think you'll start seeing interactivity more and more.'

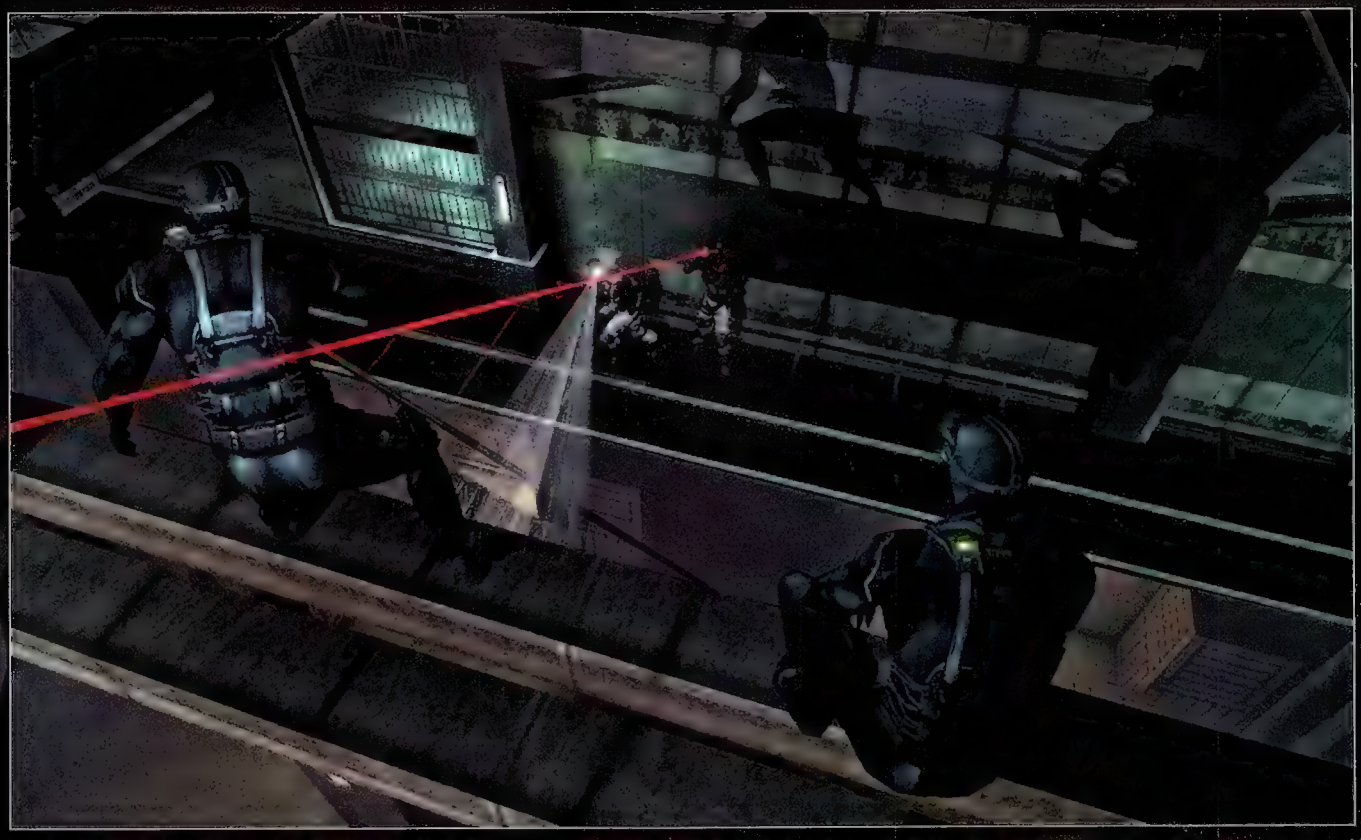
The dearth of truly 'interactive' music in games these days is the primary reason why you'll immediately notice something different about Amon Tobin's Splinter Cell: Chaos Theory score. The Brazil-born avant-garde electronic artist, who'd never worked in the gaming field before, delivered iMUSE-esque music for the Ubisoft title, where melodic layers would stack on top of each other based on the level of tension the player was currently experiencing in any given level.

'It was difficult, for sure,' Tobin laughs. 'It had to adapt to what players were doing. And it had to work in a sort of interactive way, which meant every map for the game had to have four different levels of tension, and depending on what the player did, I had to have the music adapt to that. The hardest thing, really, was trying to make it somehow coherent, given that it could change at any moment. You can imagine being halfway through a bar or a melodic line, and suddenly, it has to change, not necessarily tidily at the end of the bar, because somebody is spotted by a guard, or something. It's a challenge to create music that can move between different things.'

Despite not working in the industry before working with Ubisoft, Tobin was still prepared for making interactive music – he firmly believes you need to understand the gaming medium to write music for it. 'You need to have full understanding of how the music would interact with the game,' he says. 'I didn't have to read Tom Clancy's material behind the game or anything like that, but I needed a true understanding of how the music would have a role in the game, and I was working pretty closely with the developer. And throughout the soundtrack, we bounced back and forth all these different ideas to make it work.'

Curiously, although he sees the process behind scoring games as being fairly different to creating music for films – the closest parallel – he thinks they both ultimately serve the same purpose. 'They're both about trying to accentuate





Above What sound does a laser make? Well, it certainly isn't 'Moo'.

the action or the emotion that you're meant to feel at a certain point, and punctuate it. But mainly, just enhancing the experience; making it more convincing.'

Soule feels the same way. 'I think it's very much the same function in that music, really, ultimately, can lift an overall picture or game. Good music can take films, and just lift them. Spielberg is often misquoted on this, but the gist of what he said was that, for Jaws, John Williams' music was half of that film. I'd actually argue it was more than half. Music is a really fantastic way to get a message across. I've done some pretty tall orders, like in Oblivion, which is a game with over 100 hours of gameplay. That's an awful long time for people to sit down and spend time with music. People say they might not really be spending time with the music, because they're focused on playing the game, but I say, how often do people put on a pop record, sit down in the living room, and just pay attention to the music? Usually, they're mowing the lawn, or driving in their car, and it's probably just as distracted. There's no excuse – people are going to spend time with your music in games, and if you do it well, you can really add to the experience. Look at *Star Wars* – if you took out John Williams' score, that film would have been a disaster.'

Fundamentally, Soule sees his role as that of a communicator; he passes on to players ideas and atmospheres that developers want expressed through his music, and as such, spends a lot of time perusing concept art, design documents, and actual game prototypes, to work out what needs to be done. 'As a composer,' he says, 'you have to identify all the different psychological avenues of music, and how music should be applied to the game. To use a simple example, there was a teacher at USC film school, I believe – David Rackson, who was a legendary composer, who worked on many, many films. I think it was he who said: "In a scene where a cowboy is galloping away on a horse, the composer should not score the gallop, but rather, the fear of the rider." I think a lot of people tend to underestimate just what music's function is, and how important it is to, you know, really pull people into an experience. Music isn't a literal language, but it's the universal language, and it's actually very specific – more so than people realise.'

Judging from their responses, Soule, Land, and Tobin all feel music is a means of communicating certain feelings and ideas to players. What they also have in common, though, is that the majority of their music is composed with computers. Although Soule is famous for his grand orchestral numbers, most of the music is actually synthesised. In fact, Soule often prefers the virtuosity of the electronic medium to real-life musicians. 'I think it's actually a challenge to get an acoustic orchestra to sound as big as an electronic one,' he chuckles. 'The funny thing is, if I need more cellos, I can just dial it up. The electronic medium is quite powerful now, and on any given project I'm involved in, I'll use anywhere between 22 and 53 high-end PCs working together in, shall we say, a "musical render farm".

'We have a lot of shared tasks, and we're working with some pretty sophisticated parallel networking. But some of the protocol and the MIDI transmissions are actually coded in-house by our programmers, so we write our own technology and push the limits. I actually use my lungs to control computers – I use what's called a breath controller, which is basically a headset with a form of microphone that measures breath pressure, and converts it into digital information, and that then controls the computers."

It's clear the technology going into games music is becoming as complex as that behind the games themselves. This is a good omen – it shows that composers, sound designers, and the developers, are beginning to realise the true potential of videogame scoring; how it can lift experiences and move players in ways pretty visuals will never achieve. Sure, it won't help you get a ringside seat at Kratos' Ancient Greek love-sandwich, but if you really care about it that much, it may be time to go out and shoot some hoops.

A Splicer shows you his prized possession – a rusty old pipe! Better tell him how nice it is or he'll bonk you on the head with it.

BioShock

Logan Booker submerges himself in the creepy waters of 2K's latest shooter.

System Shock 2 is bloody hard act to follow. True, it's been eight years since Looking Glass and Irrational's riveting sci-fi FPS/RPG debuted. True, it only sold 200,000, at most, and was one in a string of critically acclaimed but commercially weak games from LG. True, LG went into liquidation back in 2000, and in 2006 Irrational (now 2K Australia/2K Boston) signed with 2K Games to avoid a similar fate.

With BioShock, the supposed spiritual successor to SS2, 2K Aus-Bos had to make a game that was as close to as good as its previous work, while hammering it into a shape that would excite, titillate and dominate at retail.

Did it succeed at meeting these conflicting demands? We'll see.

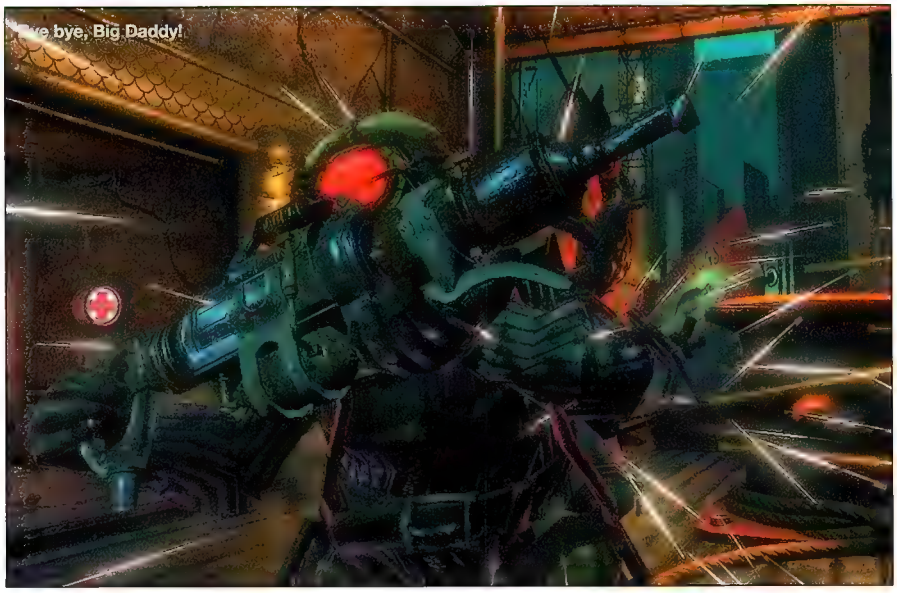
BioShock is set in the rusty, waterlogged confines of Rapture; a 1950's, art deco-styled city, built on the sea floor in the mid-Atlantic ocean to house the world's smartest, fittest and most powerful. Unfortunately, in 1959, Rapture suffered at the hands of a vicious civil war over stem cells, or ADAM, which allowed its citizens to genetically modify themselves – at the cost of their sanity.

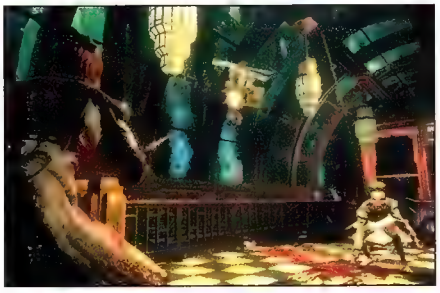
Jack, our brave protagonist, discovers the submerged metropolis after his plane crashes near the city's only aboveground structure – a lighthouse. Seeking refuge from the freezing waters and cold night air, Jack descends via bathysphere into the depths of Rapture, where he is contacted by Atlas, a survivor of the city's violent demise. With his help, the player will explore, pillage and fight their way through 15 hours of leaking superstructure, creaking corridors and hordes of deformed supermen and women.

You're not left to face them unprepared, however. BioShock's big drawcards are genetic upgrades in the form of plasmids and gene tonics. Upgrades include: setting things on fire with the click of your fingers; becoming invisible; emitting electricity when you're hit and sending bees from your arm to annoy your foes. Plasmids – your gene 'weapons' – demand EVE to function, and a supply can be kept in the form of hypos.

Plasmids and gene tonics can be found lying around Rapture, be gifted to you by its less insane inhabitants or, more commonly, bought from Gatherer's Garden machines. Instead of cash, the player pays with ADAM, which can only be harvested from Little Sisters. Each level of the game contains one to three Little Sisters,

It's all non-stop pipe whacking in BioShock.


Bye bye, Big Daddy!



protected by Big Daddies – by far the game's toughest combatants. It's not unusual to find yourself preparing a room with turrets, explosive barrels and assorted traps in an attempt to set up a ghetto ambush.

Even with these fancy abilities at your command, BioShock's veins run thick with shooter blood. Guns serve as your primary death dealers, while flames, insects and lightning deliver flavour and fun. Machineguns, crossbows and chemical throwers will be at your beck and call, as they feed parasitically off your precious ammo.

Well, at least at the beginning of the game you'll be scrounging for every single round, but by the half-way mark you'll be desperate for ways to, uh, unload the stuff, even on the hardest difficulty setting.

Hacking, the final component of BioShock's gameplay, is also the weakest. Running up to one of the many cameras, turrets or electronic vaults in the game and hitting 'V' (by default) will bring up a knockoff of Pipe Dreams. It's not entirely explained how you can sit and hack a machine in the middle of a firefight without, say, dying, but neither is the reason why this atmosphere-sucking element was implemented the way it was. If you do manage to hack a turret or camera, it'll start working for you.

So, what does BioShock share with SS2? All of the above, really, except each element has been streamlined for consumption by the mass market and console gamers. The story, atmosphere and even the music is a notch above anything you'll enjoy from a game this year, and there's impeccable polish on just about everything, if you ignore the hacking mini-game. But the replayability and depth of gameplay of SS2 just isn't present in BioShock, and there's little reason to play the game again once completed.

It comes damn close to being the perfect game, but calling it SS2's spiritual successor is slight injustice to the scariest and most innovative title of 1999. BioShock manages to do everything it needs to do right, commercially, and because of this is a fantastic, solid FPS and, admittedly, a healthy nod to its inspiration.

But it's no System Shock 3.

Another desperate housebunny in need of a solid pipe wrenching.

PC

Developer **2K Australia/2K Boston**
Publisher **2K Games**
Website **2kgames.com/bioshock**

Recommended
2.8GHz dual-core CPU; DirectX 10-complaint 3D card; 2GB RAM.

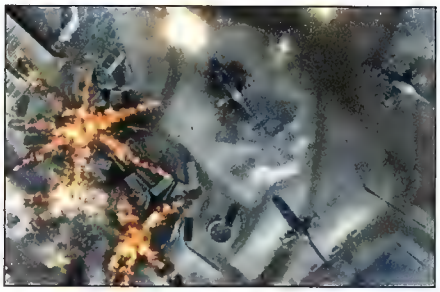
VERDICT

Plasmids and tonics; fantastic story; fresh visual design; solid shooter; atmosphere.

Less depth than System Shock 2; Vita-Chambers; boring hacking.

SCORE **9.0** OUT OF 10

Every unit in World in Conflict has more detail than your average RTS.



World in Conflict

Logan Booker wonders if there's such a thing as a real-time first person strategy shooter.

Back in the day, when fossil fuels were still cool, the Soviet Union had a hatchet (or the butt of an AK-47) to bury with the United States. Silly capitalists being all prosperous and all – how dare they improve their way of life?!

Apparently it all got a bit too much. With bulletproof ushankas placed firmly on their heads, the Soviets decided to not only invade the US, but Europe as well, cracking open the biggest can of worms the world has ever seen. We're talking Frank Herbert-sized invertebrates here.

This scary, *Red Dawn*-like scenario has been packed into digestible game form by the folks at Massive Entertainment, specifically a real-time strategy called World in Conflict. Subtract the usual slow bits, like base-building and resources-gathering, and what you have is perhaps the fastest-paced RTS in the history of RTS – so much so it plays a little like a first-person shooter.

While your hard-earned and well-honed C&C/Starcraft/Dominion: Storm of Gift 3 skills will aid you in WiC, the game has its own unique demands of the player's capabilities. For example, it's in your best interests to get acquainted with the WASD camera control, as the maps are tight enough to warrant navigating via these keys, rather than the minimap. You'll also need to get used to the fixed amount of resources that ebb into your usable pool as your units are destroyed, leaving you to focus on the make-up of your force, rather than the economics. With such elements embedded into the core of the gameplay, your fate is decided by high-level strategy, rather than how quickly you can build and manage a fleet of harvesters.

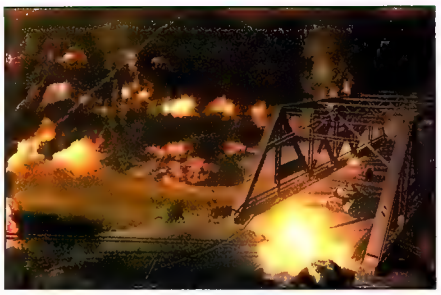
The actual meat of WiC revolves around capture points, both in single and multiplayer. While in singleplayer most missions finish once every point is snagged, multiplayer requires you to hold points for an extended period. A bar containing cropped images of the US and Soviet flags shows you total progress, and when the bar is completely filled with your patriotic cloth, the game is won.

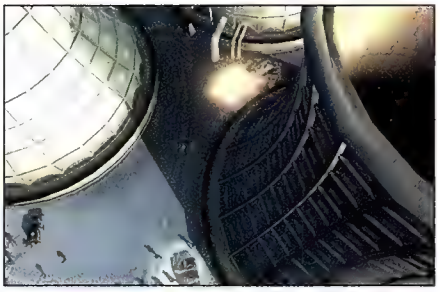
Units are deployed to the battlefield via timed airdrops. These airdrops can be customised with various troops, which require resource points to purchase. Once all your points are spent, you'll have to wait for your purchased units to be destroyed before you can reuse them. Alternatively, you can select a unit and press Delete to reclaim their resource cost after a short delay.

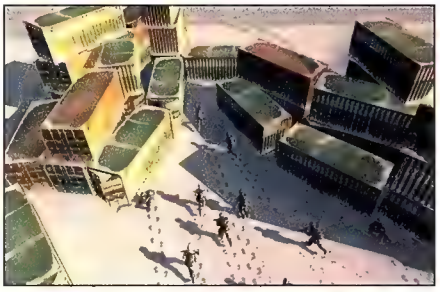
Units costs are dictated by the military arm you choose at the beginning of each game. You can specialise in air, armour, infantry or support, with the most potent units of each arm only accessible to those who have specialised.

Simplifying the unit-buying process is the limited

Blow things up the US way – with fighter jets!







selection of troops to purchase. The lack of unit variety turns out to be a double-edged sword: It makes getting into the game quick and easy, but doesn't leave you with much room to mix and match once you've mastered the basics.

Note that we found the air arm a little underpowered, requiring the most support from its allies. Hopefully a balance patch will address this in the future.

Your final tools of destruction are tactical aids. Tactical aids are paid for using points separate to that for buying units, and are gathered by holding capture points. The more points you spend on a tactical aid, the greater its effect, with costs starting from as little as five, to the incredible 'once per game' amounts of 45 and 60.

WiC's masterstroke, however, is the way it blends the very best of real-time strategy with the raw intensity of non-stop action only found in more frenetic genres.

The only thing that bogs the game down is the user interface, which is somehow heavier than your standard RTS. In the top-right you have your unit buying interface, which feels like it has more buttons than it needs. To the left is the tactical aid menu, which, with its jumble of numbers is more complex than it ought to be. Down the bottom are your unit controls that allow you to issue standing orders and use unit abilities. Sadly, they could have done with a little colour-coding, one of the more important mainstays of RTS design.

World in Conflict is a fun break from the norm, especially for veterans of the RTS genre. Games can be over in as little as 15 minutes, with the average game lasting 30.

So, if you're looking for strategy game without the boring bits, Massive's latest is worth your attention.

Tanks, also a great way to blow things up!

PC

Developer **Massive Entertainment**
Publisher **Sierra Entertainment**
Website **www.worldinconflict.com**

Recommended
2.4GHz CPU; Vista; 256MB DX10-complaint 3D card; 2GB RAM.

VERDICT

Fast-paced games; no base-building; tactical aids; ingenious resource model.

Interface a bit daunting; small selection of units.

SCORE **8.0** OUT OF 10

Ghost Recon Advanced Warfighter 2

James Matson performs recon on the sequel to Ubisoft's impressive tactical FPS.

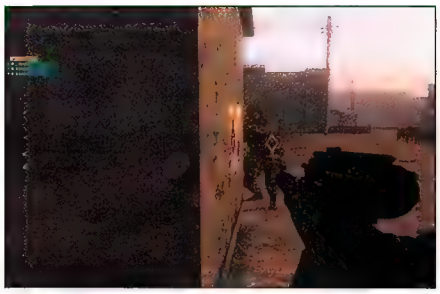
The original Ghost Recon Advanced Warfighter was a respectable and attractive stab at the tactical FPS genre. It had all the right mechanics with a dash of Tom Clancy storyline to carry it through – resulting in an engaging and bullet-saturated experience. GRAW 2 manages to continue this tradition and while it doesn't deviate far from the original, it has added just the right amount of tweaking to convince us to take up arms once again, in the name of explosions and glory. For those unfamiliar with the GRAW legacy, here's a brief rundown: Suiting up as a 'Ghost' – the codename for a bunch of highly-trained special ops troops – your job is to protect the USA, this time against a rather well organised and financed cabal of Mexican insurgents. Set in the near future, you're given a startling array of modern weaponry and support systems to wage war with, a refreshing change from the glut of WWII shooters that have had a surge in popularity in the past few years. With 10 mission zones spread across three 'acts' you'll typically be given a number of objectives within each map revolving around the destruction of bad guys and/or equipment, rescuing allies or locating secret weapon caches.

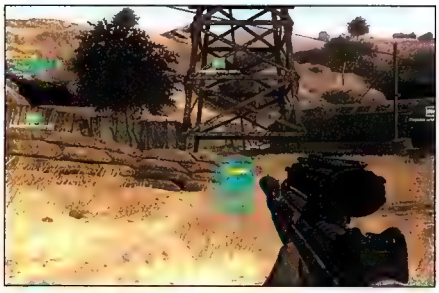
You know – all the fun stuff that elite special forces types get to do.

Thankfully this isn't any Rambo 'one-man army' deal. Joining you are your Ghost teammates, AI soldiers under your command who form a large part of the tactical element in GRAW 2. It's not enough to get yourself into the perfect position to scout for enemies or provide adequate cover as you begin picking off snipers, you'll need to use your team of Ghosts effectively, either to cover you, follow or move ahead to draw fire. All of this is tied together using the CrossCom battlefield map, which allows you to set waypoints and execute orders from a top-down view of the action, something you'll come to appreciate in the more hectic phases of the game.

The control system is thankfully a flawless reproduction of the original GRAW – an intuitive combination of mouse click/scroll wheel selection taking care of issuing orders to your group or individual Ghosts – but a couple of welcome tweaks have surfaced. Firstly your teammates can now be issued orders under two umbrella modes of 'recon' or 'assault'. This largely affects how they'll move from location to location, whether they'll tiptoe and seek cover, or just up and leg it from spot to spot.

Unfortunately, one of the letdowns of GRAW 2 and a legacy of the original is that your teammates aren't the sharpest tools in the shed. Quite often they'll be slow to react to enemy fire





and seemingly incapable of finding cover at the right time. This is in stark contrast to the enemy AI found in some of the later missions, where soldiers will identify and hone in on your position from seemingly superhuman distances.

The key element – the one that matters in a war game where the pace is wound back a little from say Battlefield 2 – is tension, and GRAW 2 creates it with finesse. You're not going to be running crazily around the map peppering random objects with lead for the hell of it.

The winding debris-littered maps combined with a heart-pounding musical score lend well to keeping you leaning around corners and taking no chances on running out in the open for fear of being picked off by a crack sniper hiding on a rooftop. The only criticism here is the uninspired use of colours and textures on each map. Surely it wouldn't have hurt to have one or two buildings that weren't painted in the same drab browns as everything else?

In addition to the engaging (albeit seemingly short) singleplayer game is a solid multiplayer component. Several game modes are there for consumption, including recon-versus-assault, standard deathmatch, co-operative campaign modes and the grossly named 'Hamburger Hill' (where one team must hold a zone against the opposing team for a certain amount of time).

It's simple but welcome additions that make GRAW 2 a great sequel. Apart from minor tweaks and new missions the game doesn't do anything revolutionary. The graphics engine is still the same, the Clancy storyline is a little thin, and some of the features like alternate weapon loadouts and interchangeable members for your squad seem a little pointless when things go smoothly if you don't touch anything, but this is far outweighed by the pure satisfaction of getting through a difficult mission with your entrails intact. GRAW 2 has everything you need from a tactical FPS.

PC

Developer **Grin**
Publisher **Ubisoft**
Website **ghostrecon.us.ubi.com/graw2**

Recommended
2.8GHz CPU; 1GB RAM; DX9 card.

VERDICT

Tense moments; diverse mission objectives; updated control interface.

Loses out in the longevity stakes; could do with better teammate AI.

SCORE **8.0** OUT OF 10

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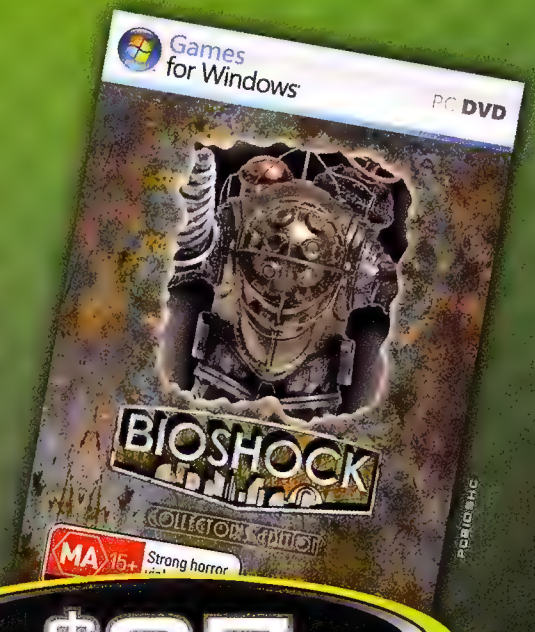

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Dynamite Warrior

DVD Distributor **Madman** Director **Chalerm Wongpim** Starring **Dan Chupong, Phutthiphong Sriwat**

We expect only one thing from martial arts movies – guys fighting each other. That's the whole point of the genre. The plot of a martial arts flick serves the same purpose as the plot of a porno – an excuse for the action. It need not be complex and deep, it just needs to put the hero in a place where he's able to hurt lots of people.

Dynamite Warrior thinks it's something else. The story is convoluted. The hero is as reliant on 1890's rocket launchers as he is on his fists and feet. And then there's all this stupid magic stuff. What little hand-to-hand combat there is, is poorly choreographed and tarnished with CGI. Ugh. *Dynamite Warrior* can be summed up in a two words – one of which is 'boring,' the other, 'terrible'.

Okay, we're being a little mean. *Warrior* does have one redeeming feature. See, it turns out the hero will only be able to kill the villain if he hits him with a rocket that's been soaked in the menstrual blood of a virgin. On discovering this information, our hero proceeds to calmly ask the nearest virgin if she's on the rag. This doesn't impress her. And so our hero is reduced to trying to win her over with acts of kindness in order to claim his prize. Really, it's like something from a tampon commercial. Does he succeed in his quest? We could tell you, but that'd be spoiling the one good part of the movie. **CT**

score **3.0** OUT OF 10

Cocaine Cowboys

DVD Distributor **Madman** Director **Billy Corben** Starring **Jon Roberts, Al Sunshine**

Charlie. Big C. Blow. Candy. Florida Snow. Call it what you will, cocaine was *the* drug in Miami during the 70s and 80s. The city was teeming with addicts – making those who imported and distributed the stuff very, very rich. *Cocaine Cowboys* chronicles the rise of the Miami coke trade during these years, focusing more on the people at the top of the industry – the smugglers, the managers, the hitmen – than the low-level slingers, thugs and fiends. The 'characters' of *Cocaine Cowboys* lived lives so lavish, so violent and so over-the-top that Tommy Vercetti's Grand Theft Auto: Vice City exploits almost seem mildly embellished as opposed to wildly exaggerated. The descriptions of what these people got up to are by turns disturbing and hilarious, disgusting and awe-inspiring. We're talking people who'd visit their local Mercedes dealership maybe a dozen times in a year to buy a new car for a mate, a girlfriend or themselves, because they'd managed to trash their last one. *Cocaine Cowboys* is a fascinating movie. No doubt it will hold appeal to those who enjoyed films like the George Jung biopic *Blow*. Our only real criticism is that it's too short. Yes, it does run for two hours – quite long for a documentary – but we feel that there's enough material for it to have been expanded into a five or six-part miniseries. We are pleased to report that there's a sequel in the works. **CT**

score **9.0** OUT OF 10

ANIME OF THE MONTH

Your regular dose of anime goodness courtesy of our resident expert **Armina Soemmo**.

The Melancholy of Haruhi Suzimiya

Studio **Kyoto Animation** Web **www.madman.com.au** Price **$29.95**

The Melancholy of Haruhi Suzimiya centres on the normal, uninterested schoolboy, Kyon, who once dreamt of meeting aliens, time-travellers, and ESPers. Feeling that his imaginings would never come true, he decides to enter high school and live a normal, boring life. That is, until he meets a girl in class, Haruhi, with oddly identical interests. The charm of the series is that it skewers anime conventions and fandom peculiarities while still including all the usual anime fun – psychics, aliens, and yes, two female leads in bunny costumes. For all these oddities the real appeal lies in the characters. Although anime is traditionally replete with bold, assertive female leads that buck societal norms – Haruhi, the title character, is an element unto herself. She's twisted, unique, audacious, bossy and ultra hot.

Not everyone will 'get' the series, but overall, if you like postmodernism and if you're anything but normal, then you'll love it.

score **9.5** OUT OF 10

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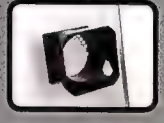

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GEEKETTE
A girl's eye view of the gaming world.

Even animated game characters have more expressive ability than old Keanu.

Break a leg!

Kate Inabinet whips out her hammer and hobbling post for the sake of art.

I like to break legs. Tear limbs from bodies, jaws from faces and pop eyes from skulls with more gusto than a cannibal at a wake. Before the caffeine from my morning coffee has even hit my veins I am snapping elbows and pulling vertebrae apart as if they were New Year's poppers!

Yet I wouldn't describe myself as a violent person.

In a fight I am more inclined to flesh out my sentences with colourful language than flex my muscles, and I roll more eyes than punches when an argument gets heated. So why all the thuggery?

Such is a day in the life of an animator, and I love my roll as an industry heavy.

Animation is all about creating an impression at a glance. Emotion and intention should be clearly visible in a pose or gesture before lipsync or facial expression is even thought about. Sometimes, the best way to obtain this goal is to break your character – in a multitude of satisfyingly eye-watering ways.

Making an elbow bend backwards on its swing is a common trick in walk cycles as it creates the impression of fluid movement. The eye doesn't register the broken arm – it only sees the arc of the motion. Bending knees and ankles out at odd angles can create a multitude of funny gaits, and as long as the poses all work together the brain won't pay any attention to those nasty busted bits, only the gesture as a whole.

Facial animation is much the same. Just moving the correct muscle groups isn't going to deliver a piece of dialogue credibly. It needs to be acted.

Keanu Reeves in *The Matrix* does a beautiful job of speaking. His mouth shapes are plausible, and all his facial muscles move realistically, yet his performance is almost always unconvincing. He doesn't need an agent to steer him toward less emotionally taxing films… what he needs is an animator who isn't afraid to break his face to sell a line. The occasional eye protrusion or unhinged jaw would go a long way toward injecting some fear or surprise into his roles.

And when a character finally gives up the ghost from all the pain and agony, don't just have him crumple to the floor and expire. That would be way too boring an exit for our object of sadistic amusement.

Death animations are one of the most entertaining animations to create because that is when you truly have the most freedom: Hurl your character up into the air and pull all his arms and legs off, like a Christmas turkey at dinnertime, before smacking him back down to the floor in a quivering heap. Or have him thrash about on the ground like a sprayed blowfly before finally exploding into a mess of toon body parts. The only limit is imagination, and half the fun of creating a death is making it larger than life.

> **"Or have him thrash about on the ground like a sprayed blowfly before finally exploding into a mess of toon body parts."**

Not all characters allow for such overstated exercises in cruelty though. A life-like human character would be limited by rules of skeletal rotation and muscle contraction, and the only stretching to be had is of poses. Hyper-exaggerating anticipation and follow-through make certain animations, like throwing something – a kitten perhaps – easier to read by the viewer. Kind of magnifying the action, rather than breaking something to force an illusion.

Of course, once you have the taste for blood, it's hard to rein yourself in. So I'll go ahead and break that elbow on the walk cycle. No one will see anything more than a perfect arc in a lovely arm swing, and unless I lipsync my character to dob on me, no one need ever know how he suffered.

We'd die an animated death for Kate.
geekette@atomicmpc.com.au

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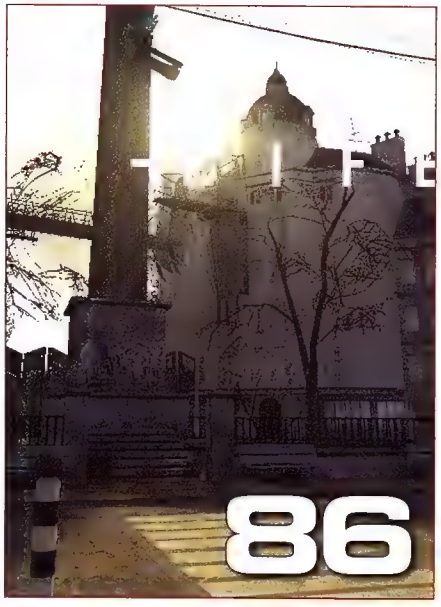
TECHNIQUE

HANDS-ON TUTORIALS FOR THE TECHNICALLY INCLINED

Eight marvellous pages of tutorials this month, just for you! First up, we have a sprinkling of the fresh, Mediterranean-flavoured words of Jake Carroll. He's not exactly exotic, but his tutorial on virtual gaming is about as spicy as they come. Plug in to a make-believe machine that exists somewhere between limbo and purgatory and play games in a box inside your box. Continuing on we have Ron Prouse, who's managed to whack some hard drives into a model car chassis. Storage simply can't get sexier, short of watching Jessica Alba eat USB flash drives.

Actually, that'd be really disturbing. You get the idea. Get stuck into it team *Atomic*, then go play BioShock some more.



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Jake Carroll puts a phantom CPU and imaginary 3D card into his virtual PC and attempts to play games... where no game has been played before.

Build your own NAS car 90
Ron Prouse takes a pair of hard drives and sticks them inside a model car. Not only does it have wheels, but you can plug it into a network and store your videos on it too!

Input Ouput 94
Dan Rutter can't get enough you're your technical problems. Hungry like a liger, he is.

Hotbox 96
A new, beautifully modded case for your eyes to gaze at in a loving fashion. Just resist the temptation to lick it.

Fallout 98
Logan Booker writes about something insane again, as if he actually were mentally ill.

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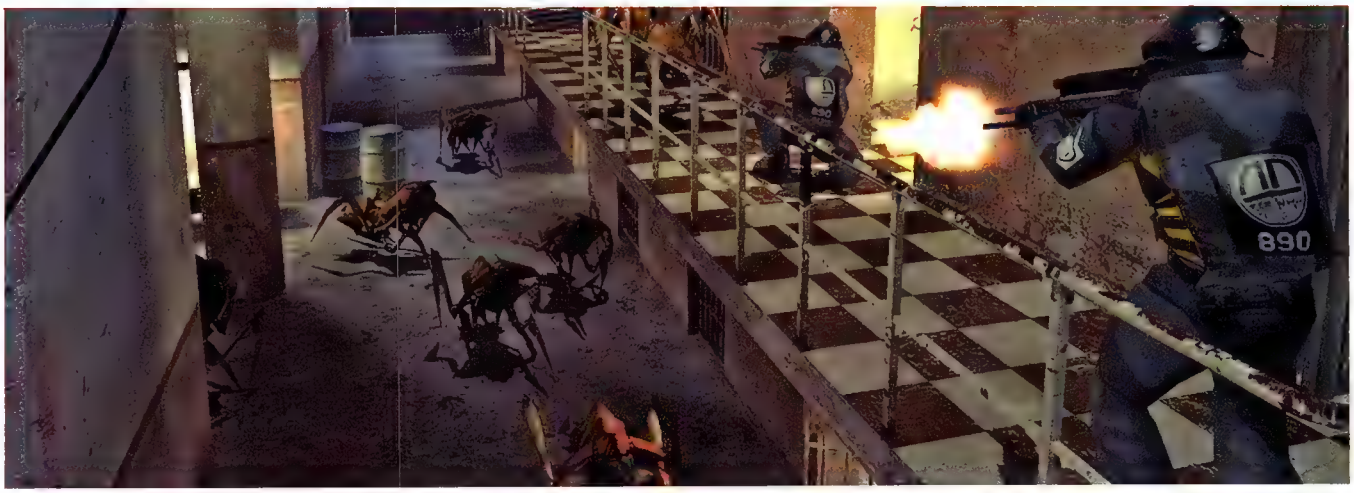


DIFFICULTY **INTERMEDIATE**

Virtual machine gaming

Jake Carroll shows you how to make your gaming experience less reliant on Microsoft.

There was always going to come a day when computers would become so fast that we could run multiple operating systems simultaneously, side by side. It was predicted about 35 years ago, in fact.

While this prediction did come true, it never came true in the way the analysts expected. They envisioned massive computers with their 'CPU' and 'RAM' physically caged off between separated concurrent operating systems. The truth was, the concept of the hypervisor would be born, and 'to the metal' instruction passing would become the accepted way to virtualise.

All this gave way to the VMware, Xen, Zones, Jails and Parallels we know today. *Atomic* folk are a pretty experienced lot concerning virtualisation, being treated to regular guides and in-depth tutorials on such concepts. We've been serious for too long.

Let's have some fun.

Experiment responsibly

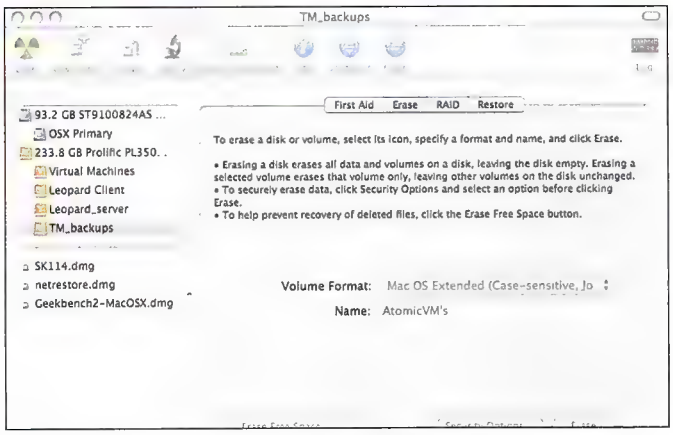
Both Parallels and VMWare Fusion now experimentally support Direct3D/OpenGL hardware acceleration within Windows XP as the client OS. This gives us free run of all those lovely shader pipelines and hardware transform/lighting streams. Creating an ideal environment for this schizophrenic gaming powerhouse is a fine art.

We'll be using Parallels 3 build 4560/VMWare Fusion beta RC1 (on the Mac) and VMWare Workstation 6 (Windows/Linux) as our base. We'll assume you have an existing installation of your virtualisation product on your MacBook Pro/iMac/Mac Pro or generic x86-based computer.

Disk preparation

Our primary testbed is Mac OS X, so we'll explain disk layout here first. You'll need to create a new partition, ideally, for such exploits as virtualised gaming. The reason behind this relates to segregated IO on your physical storage media. In a perfect world, you'll have a new HFSX (note, this is not HFS+, but journalled, case-sensitive HFS) partition living on a totally separate physical volume from your system disk. We recommend an additional internal SATA drive or a separate, external FireWire-connected disk.

Similarly, if your virtual host is Windows/Linux-based, it is wise to have separate partitions and, in a best case scenario, totally separate physical disks to target for your virtual machines.



HFS case-sensitive journalled formatting (HFSX).

Creating a HFSX volume can be accomplished via the command line or the GUI in Mac OS X. It is always most simple to use the graphical Disk Utility.app tool found in /Applications/Utilities/Disk Utility.app.

The above image illustrates the drop-down capable box used for HFSX formatting, within Disk Utility.app.

If virtualising with a Windows or Linux host, it is expected that you'll use a native format for your platform, such as NTFS for Windows XP/Vista and ext3 or ReiserFS for Linux. We strongly discourage the use of FAT32 for these purposes. If you have the technology at your fingertips, ZFS or SAM-QFS are ideal and will provide maximum performance, albeit at a significant cost and could be considered overkill.

Our gaming volume is a partition on a standalone physical disk around 40GB in size, connected via FireWire. We've made the partition this large so we can comfortably fit a virtualised operating system as well as several games/swap space and other applications onto the virtual client.

CPU considerations

Don't do this without a dual-core environment. Just don't. Virtualisation hypervisors love exploiting the use of SMP to the extent that they are allowed. Given that we're attempting to render a whole graphics and audio subsystem while we have a primary OS running above it all, you start to come to grips with the wisdom in multiple cores. As a bare minimum a Core 2 Duo or AMD X2-series 64-bit CPU should suffice. Those with Mac Pro's are in for a treat, with the raw power of dual Xeon Core 2 Duo-based processors feeding your virtual machines quite effortlessly.

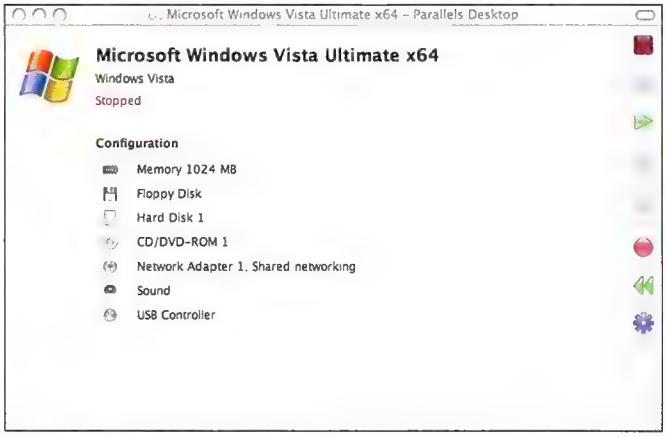
Memory considerations

Fortify yourself with at least 2GB of RAM. We'll be ducting 1GB to our virtual machines. Most games recommend upwards of this amount as a standard specification currently, so we will give our virtualised titles a fighting

chance. If you are running a 32-bit host, your effective memory ceiling is 4GB. If you are running a 64-bit host and have the appropriate hardware, you can go well above this limit, but keep in mind that you may need to enable memory remapping flags within your system BIOS in order to escape memory-write holes/remap discrepancies above 4GB, which virtual machines tend to be fussy about.

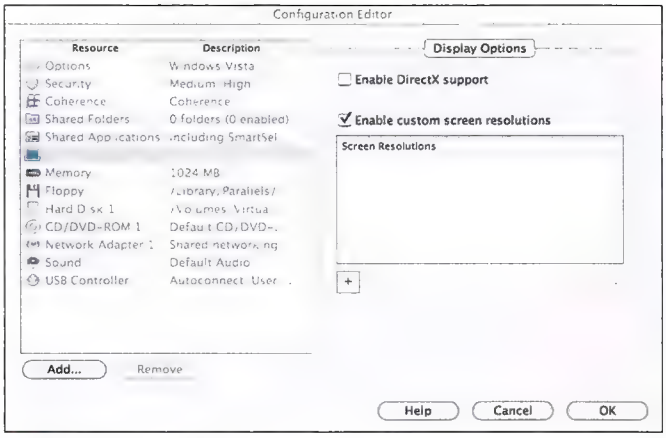
Flipping the big X switch

We have created a Windows Vista Ultimate x64 and Windows XP Pro 32-bit virtual machine. If you don't have a 64-bit host system, 32-bit client VMs will suffice. After our virtual machines are installed and updated, we will try running some tests, to prove our shader paths are accessible. The below image shows the initial setup of our VM. This particular machine is running externally, on a physically-separated FireWire 800 hard disk.



Virtual Machine simple config.

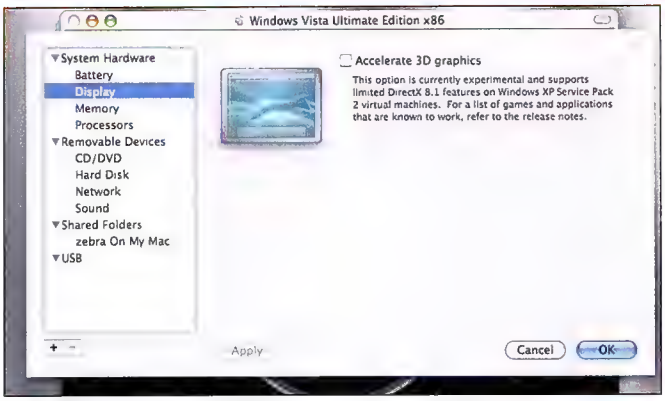
Below again shows the 'Edit Virtual Machine' menu. In here, we need to tick the 'Enable DirectX Support' box. Do not worry that there is no related option for OpenGL. It is intrinsic within the acceleration architecture provided.



Parallels DirectX config.

You should also consider entering the 'Memory' options section and turning the amount of virtualised video memory up to 64MB. We've found this is one of the problems that your virtual environment can run into if attempting to load games, in that the screen buffer is starved of memory. VMWare fusion is a little different, in that we have some additional options to enable for optimal performance. The top right image opposite shows VMWare Fusion's DirectX hardware acceleration option.

For optimal results, VMWare Fusion allows us to go a step further, in assigning 'virtual SMP' on multiple processor cores, as shown in the second image to the above right. This is a considerable step, as many game engines support SMP execution.



VMWare Fusion DirectX config.

VMWare Fusion virtual SMP config.

Things aren't as easy for Windows or Linux-based VMWare Workstation users. The versions of VMWare are not as advanced yet on these platforms. As a result some 'manual' fiddling is required. First, you'll need to make sure your host system is running accelerated drivers for your respective hardware. Within Windows, start 'dxdiag', using Run from the Start menu, click the 'Display' tab and go through the DirectDraw/DirectDraw3D tests. For Linux, try the following:

```
glxinfo | grep direct
```

You should be presented with a Direct3D process ID. If it isn't running, you'll probably need to reinstall your drivers correctly. Afterwards, try running:

```
glxgears
```

If this works, your GPU driver is installed correctly under Linux.

Next, you'll need to make some changes to your .vmx configuration file, in both Windows and Linux. Add this to the configuration:

```
mks.enable3d = TRUE
svga.vramSize = 67108864
vmmouse.present = FALSE
```

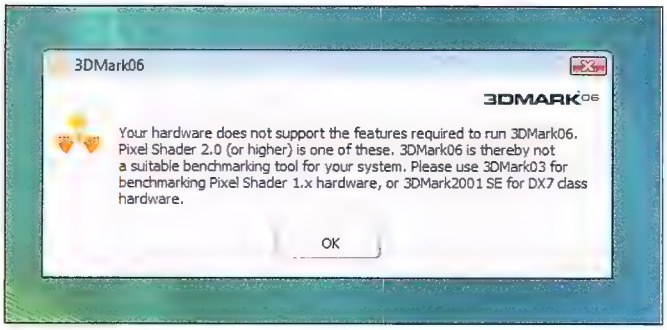
Save the file and exit your editor.

Finally, in all versions of Parallels and VMWare you'll need to install VMWare Tools/Parallels Tools within the guest operating system, as well as making sure you have the DirectX 9.0c End User runtime installed. This can be obtained from Microsoft directly: **www.microsoft.com/downloads/search.aspx?displaylang=en&categoryid=2**.

Inside the machine

So, with our configuration behind us, we will load into the virtualised

Windows environment. The first thing we should test is that our shader paths are working correctly, thus proving the virtualised GPU is functioning. We installed 3DMark06 in Windows Vista and Windows XP on all the virtual client operating systems. Below shows our results, on executing 3DMark06.

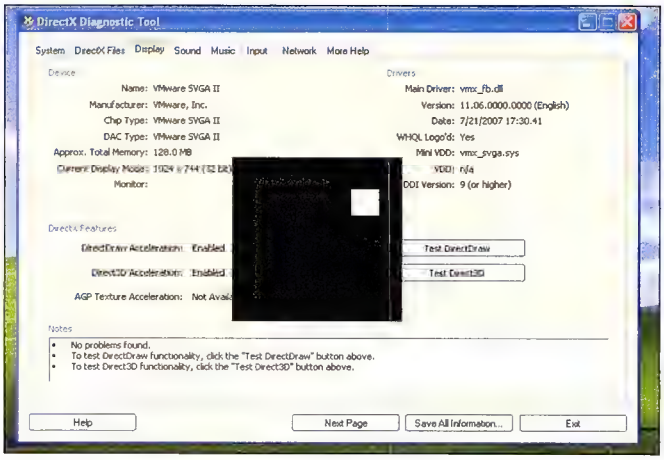


Virtualised instance of 3DMark06.

Hang on a sec. Aren't VMWare and Parallels supposed to support Direct3D 8.1/Shader Model 2.0? Sufficed to say, no; 3DMark will not run in the capacity you want it to. So, time for some less obvious tests. We decided to check out the actual DirectX subsystem, to make sure it was rendering correctly. Inside the virtual operating system, from the 'Run' command:

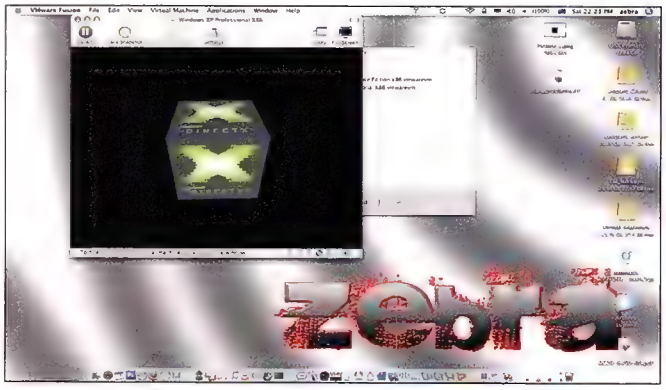
```
dxdiag
```

This brings up the DirectX diagnostic panel for Windows XP/Vista. From here, we go straight to the Display tab and attempt to run the DirectDraw and DirectDraw3D tests that check each revision of the Direct3D interfaces, as it goes. Below shows DirectDraw working correctly.



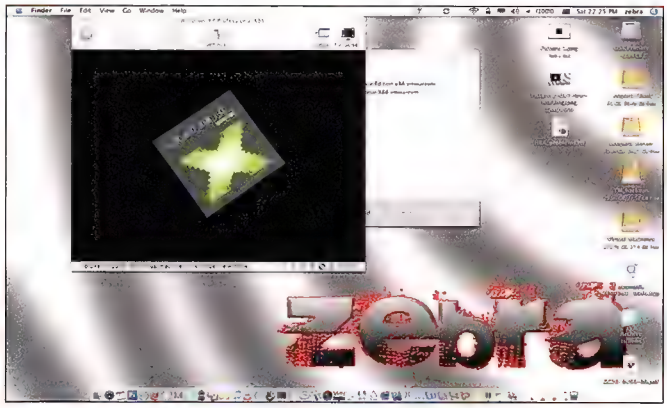
DirectDraw functioning inside a VM.

Next, we should test Direct3D 7 interfaces with DirectDraw3D.



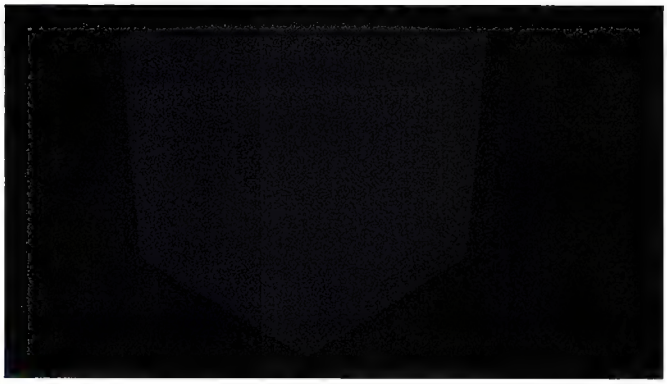
Direct3D 7 interfaces working.

Getting a little more adventurous, we try out Direct3D 8.0 interfaces.



Direct3D 8 interfaces working.

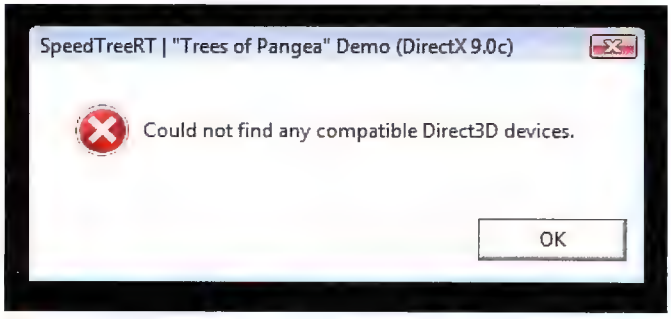
Finally, we should test Direct3D 9.0 interfaces.



Direct3D 9 interfaces failing.

Failure! As expected and as stipulated in the Parallels/VMWare guidelines, Direct3D 9 shader paths do not work yet.

Next, we decided to try and isolate the shader models using the SpeedTree tool. The SpeedTree algorithm is implemented in various games, from Half-Life 2 to Elder Scrolls: Oblivion. Running SpeedTree gave us the following results:



SpeedTree D3D failure.

VMWare Fusion, VMWare Workstation and Parallels all raised this error on execution of the program. Only Parallels ignored it and kept attempting to render the scene, as can be seen in to the right.

Parallels rendering SpeedTree.

Where for art thou shaders?

Despite the promises of Direct3D 8.1 compliance, we don't seem to have any Shader Model 2.0 paths in the benchmarks we've tested. This isn't to say that they don't exist, but it does suggest that there is more to GPU virtualisation than simply telling the virtual machine to use acceleration capabilities and then letting it 'figure out' what paths are available to it. The next step is to try out some games.

Official titles that work

Both Parallels and VMWare have published a set of guidelines stating what games will work with their experimental 3D accelerated virtual environments.

VMWare Fusion/VMWare Workstation

- Aliens vs Predator Demo
- Breath of Fire IV
- Grand Theft Auto III
- Hitman 2
- Lord of the Realms III
- Max Payne 1
- Max Payne 2
- Need for Speed Porsche Demo
- RalliSport Challenge
- Tony Hawk 3
- X2 Rolling Demo

Parallels

- Alien Arena 2007
- Baldur's Gate 2
- Bus Driver
- Call of Duty
- Doom 3
- Duke Nukem Manhattan Project
- Dungeon Siege 2
- GORE – Ultimate Soldier
- Hitman Codename 47
- Hitman Silent Assassin
- Hitman Contracts
- Max Payne 1
- Max Payne 2
- Neverball
- Prey
- Revolt
- Quake 1
- Quake 2
- Quake 3 Arena
- Return to Castle Wolfenstein
- Serious Sam – The First Encounter
- Serious Sam – The Second Encounter
- SiN
- Unreal Tournament 2004
- Warcraft 3
- Wolfenstein – Enemy Territories
- Worms 3D

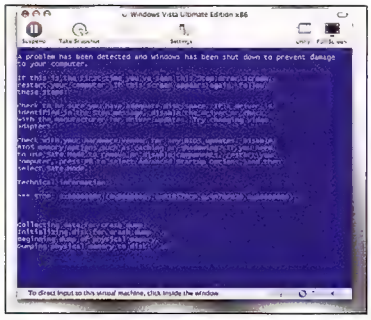
We thought we'd try and bite off a little more than the virtual machine could theoretically chew by trying some very high-end current titles first.

Supreme Commander

Running this game has proven not so supreme. In all virtual machines, the game installs correctly but fails to initialise, not detecting appropriate hardware support. The minimum required system specification suggests we were thinking wishfully (Direct3D 9 and Shader Model 2.0 required).

Half-Life 2

We had high hopes for Half-Life 2, given it is the promoted material approved to work with Parallels. Unfortunately, within Windows Vista, it failed to launch under Parallels. It also failed to launch under VMware Fusion, failing spectacularly and resulting in a BSOD within the virtual machine.



Half-Life 2 fails at life!

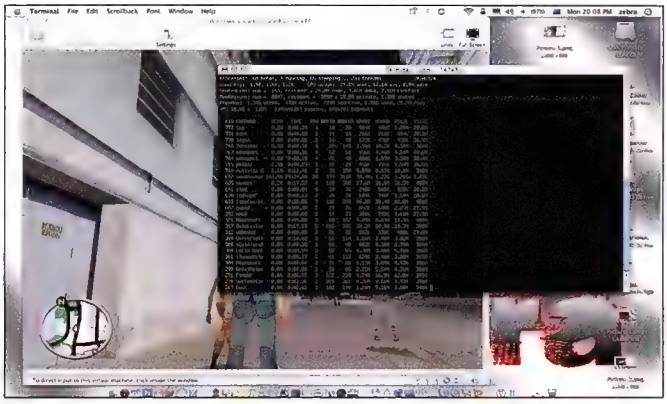
After hours of experimentation, we found the only working solution currently is to use a Parallels v3 build 4560 install with Windows XP virtualised. Finally, we have Half-Life 2 virtualised! Implicit in this is Counter-Strike: Source. Frame rates were gauged with the CS: Source video stress test. Unfortunately, with an average frame rate of between 6 and 11fps @ 1440 x 900, it is hard to consider it playable. A good tweak is to minimise host OS system activity by killing as many non-critical processes as possible, as well as allocating as much homologous system RAM as possible to the VM. Even so, the performance gains are (currently) small.

Half-Life 2 running in Parallels, WinXP.

Quake 4

With a little tweaking on the graphics buffer in the VM configuration (we have found 32MB seems to be optimal for Quake 4), this game runs and runs playable! Shaders seem intact and the levels have all the typical characteristics of a Carmack-crafted creation. Bump maps, normal maps, and specular shading – it's all there! We maintained an average of 22fps inside levels and around 18fps outside. This was running at 1024 x 768 with no graphical tweaks apart from gamma/alpha adjustment. Typical CPU usage on a Core 2 Duo-based Mac fell between 37 and 54% while in-game, somewhat proving that the GPU was central to the processing work.

Time for something a little different. We decided to try out GTA: Vice City. Note that we found it impossible to run inside Parallels, so in this situation we've resorted to VMWare Fusion. Below shows the game running in 1024 x 768, in 32-bit colour. We found serious sound and graphical problems at first. After a little experimentation, we found that the 'graphical trails/ shadow tails' options needed to be forced off and the sound driver should be turned to D3D Software Emulation. It would not run in hardware/EAX. We recommend refraining from trying to virtualise sound processors while virtualising graphics processors at this stage.



Grand Theft Auto: Vice City in VMWare Fusion.

Worth noting is the vmware-vmx process using 163.9% CPU time. GTA3 was by far the most intensive virtualisation task attempted. It essentially used all the resources of both cores and wrote into virtual memory space, above and beyond that of our virtual caged 1024MB limit.

Conclusion

We've learnt an important lesson in the process of this tutorial. Just because a set of shaders is 'supported' or 'implemented' by the hypervisor, doesn't necessarily mean they will work or render. It would appear that both the VMWare Fusion and Parallels team are working on a game-by-game basis to make titles work with their hypervisor technologies. While VM gaming is becoming a reality, we feel you'll still be waiting quite a few months to play your favourite game with any fluidity or consistency of experience. That said, every day we creep closer to perfection.

DIFFICULTY INTERMEDIATE

Build a NAS car

Ron Prouse drives his model car in more ways than one.

SUPPLIERS

PC Case Gear: **www.pccasegear.com**
1x NS-347 NAS network hard drive enclosure, $148
1x Macpower USB 2.0 Ice Cube II hard drive enclosure, $89
2x Samsung Spinpoint 250GB SP2514N IDE HDD, $102

DISCLAIMER

Power-tools, sharp objects and electrical energy can all be dangerous to your current state of wellbeing, so take care and follow all relevant safety precautions. Especially eye protection. If you are unsure of such precautions, seek professional advice. Any omission regarding possible hazards is not the responsibility of *Atomic* magazine or the writer.

One of the quiet but exciting evolutions of the last few years has been in the area of affordable electronic storage, from sub-$400 750GB hard drives right through to 8GB thumb drives. To many, this might not be an area of great rejoicing, but for those of us who remember the 4GB hardware limit for system hard drives, and prices of around $50 per GB of storage, the seemingly infinite space available on modern hard drives is a thing of beauty and a joy forever.

One of the best options available to augment the data capacity of early machines, especially if you had run out of internal IDE ports, was the humble external drive enclosure. FireWire 400, and eventually USB 2.0, gave transfer speeds that made this option more viable, with the added advantage of shared connectivity over multiple computers if required. It worked, as long as the host computer was turned on, but it wasn't really the hardcore answer that we wanted – true network access storage, or NAS, at home.

NAS servers have the flexibility of being available to all of the computers on the home network all of the time,

making them the perfect answer for storing and sharing music, videos and other cool stuff. The only drawback in 1999 was that the price tag put them out of most people's budget – a 240GB Unibrain Soho NAS (2x 120GB) had a $2000+ RRP.

Fast forward five years, and the humble external drive box has evolved into a hybrid creature that can transfer any old IDE hard drive into versatile network-based storage device. Install your hard drive into this enclosure, and simply connect to your network via the RJ45 LAN connections on the back. Match it up with a 750GB hard drive, and you have a total network storage solution for less than 75c per GB.

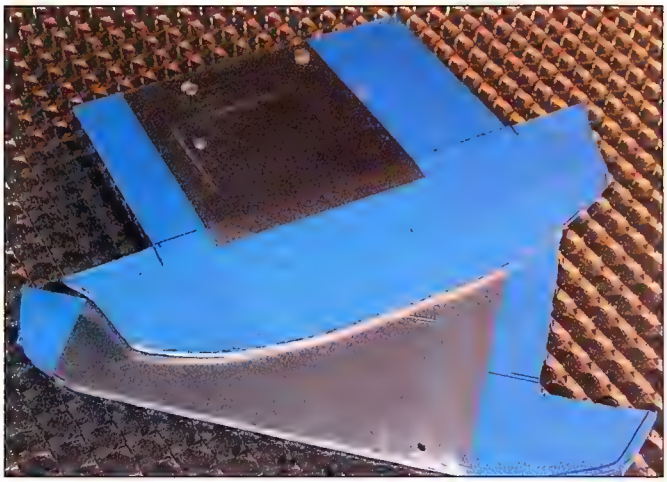
1 There is only one problem. External hard drive cases are really, really boring to look at. Thankfully, with a little bit of imagination, and a few basic tools, you can shake things up a bit and create a NAS server that will put a smile on everyone's face.

The starting point for our project was a 1/10th-scale plastic car body – a RacingWorks 350Z Nismo drift car to be precise – the type usually used for remote control cars.

A quick Google under 'RC model supplies' should find you something local. The choice of vehicle is a personal thing, and there are plenty of options that will reflect the personality of your own build – tanks, boats, planes or EBE transports will all work in a similar manner.

The body we used came equipped with an H-shaped plastic chassis, which was really just designed to locate the wheels in place during transport, however it was sturdy enough to use as the starting point for our own custom aluminium chassis plate.

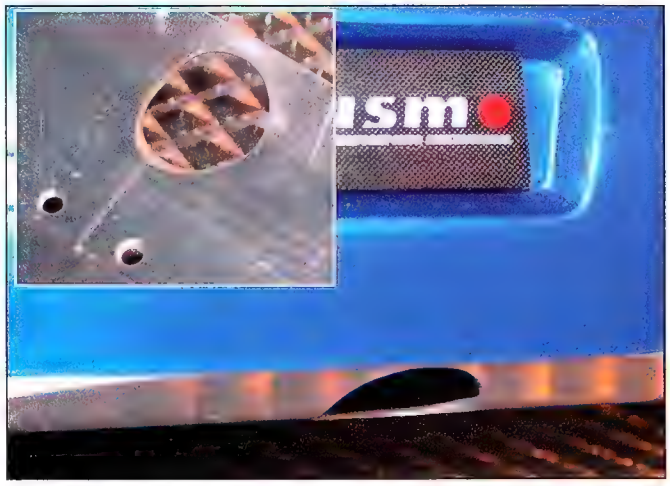
2 The next step was to make up the front and rear aluminium mounting plates that would be used to locate and secure the body. The first issue to overcome was that there was so much flex in the 0.5mm thick plastic body that it was impossible to trace around the outer shape with any precision. The answer was to photocopy the body along the contour, and then transfer the shape on the paper over to the 1mm gauge aluminium sheet. The plates were then cut out with a jigsaw, filed to exact shape and sanded smooth with the edges rounded over. The 3mm mounting holes were drilled in-line with the plastic chassis, countersunk to give a flush fit and the screws cut to the correct length with a Dremel.



3 The front and rear plates were fitted to the chassis several times, as the exact bend was ascertained to follow the correct line of the body. The rear plate has had the more obvious bend, as it needed to follow the cut-away of the rear bumper bar.

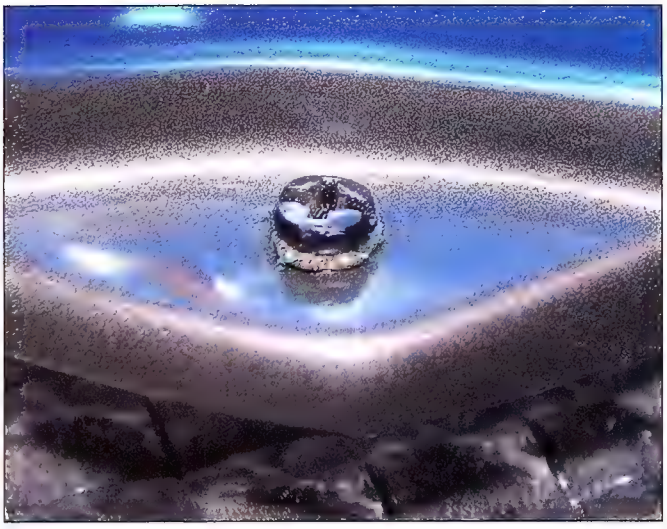
Once the lower plates were fitted, the chassis could be modified to fit the most important section – the hardware mounting platform. The original chassis had support gusseting around the inside of the semi-circular 'inner guard' sections, and they were first removed with a sharp chisel. The aluminium mounting platform was then measured and fabricated, and screwed through the plastic chassis and into the front and rear plates. This method created an aluminium/ plastic/aluminium sandwich that is extremely rigid, and extends right out to the body sill panels. The dimensions are as follows – overall length: 430mm; overall width: 190mm; across the pseudo-wheel arches: 130mm; and lengthways between them: 190mm.

Just out of interest, these dimensions would allow for a VIA EPIA board to be mounted comfortably in the centre section, so squeezing a fully-functional mini-PC into this body size would not require much additional work.

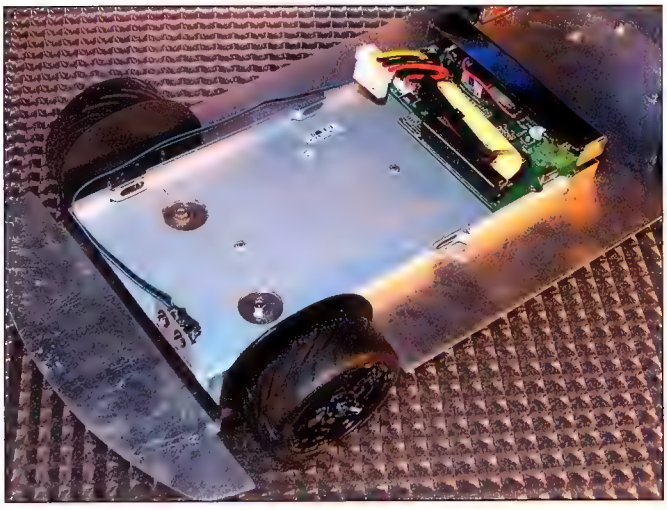


4 The next task was to drill out a hole in the rear of the chassis for the cabling to pass through, remembering to allow plenty of room for the connectors. Using a 20mm hole-saw through the curve of the rear section resulted in an elliptical-shape that allowed for the wires to pass out in a gentle S-bend rather a than tight 90° angle that would potentially lift the back wheels off of the ground.

To finish off, two 3mm holes were drilled and countersunk so that a zip-tie could be used to hold the cables in position.



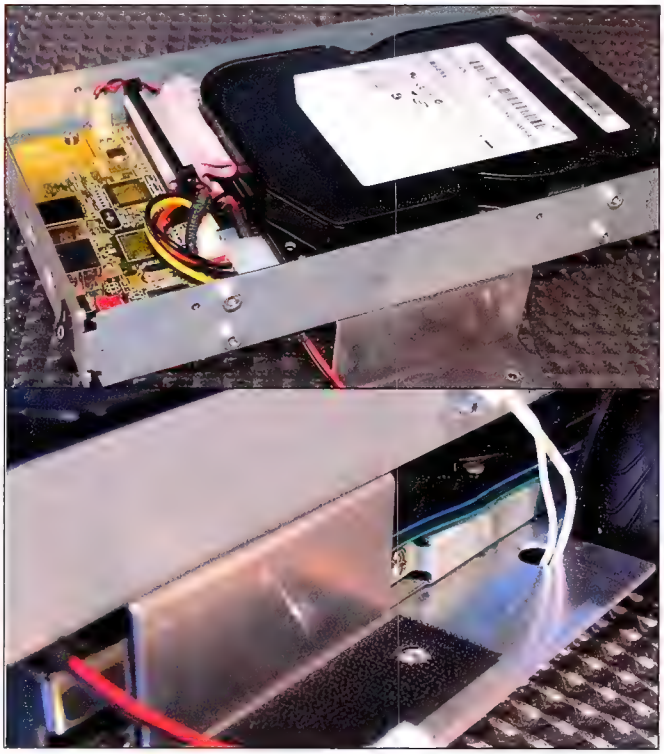
5 The chassis plates had been shaped right out to the edges of the body shell, so that shell could be secured on all four corners in an unobtrusive manner. Using a soldering iron with a 3mm tip, the positions for the holes were marked and then melted through from the inside. Melting plastic this thin has an advantage over drilling, as the



excess plastic forms a thick ridge around the perimeter of the hole and acts as reinforcement against tearing.

With the body positioned onto the chassis the hole locations were marked and 2.5mm holes drilled through the aluminium. The holes were threaded with a 3mm tap, and short screws used to fasten the two components together.

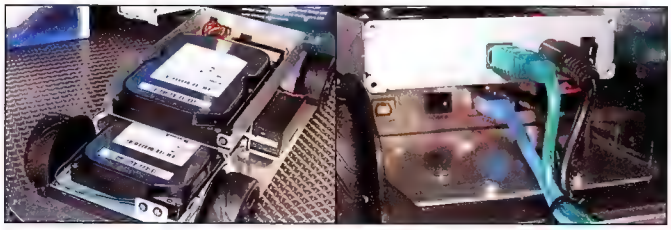
6 With the chassis and body sorted out, we can actually start bolting in PC components! The network drive rack was fitted as the first level, with two 20mm cut-outs drilled in its base to coincide with the protruding chassis screws – the idea is to have the drive rack sitting flat on the floor, and then secure it in place with two 1/8" rivets, as they have a very low profile and unlikely to interfere with the fitting of the hard drive.



7 Fabrication of the second storey platform for the top drive involved using an engineer's vice and flat steel bars to fold a 70mm wide by 230mm long section of 1mm thick aluminium sheet into an upside-down U shape, with the tips bent outwards. The perpendicular uprights are designed to place the upper drive just 3mm above the top of the lower one. This will allow for some ventilation, while keeping the hardware profile low enough to fit under the car body. The upper drive rack was drilled and then riveted to the platform, using three 1/8" rivets in a triangular pattern for rigidity. The 12V power rail was split at the molex connector, and two additional power leads run out through 6mm holes drilled on either side of the HDD. These will power the cathode tubes under the chassis – yes, there has to be some bling!

The upper level can now be attached, riveted to the lower level down each side of the centre chassis. A 70mm length of self-adhesive velcro was stuck on each side if the bracket and a 12mm hole drilled in the front section of the floor pan on each side.

8 Next came two power invertors and blue 100mm cathodes, mounted under the centre of the chassis (Jaycar Cat# SL2868, $5.95 and SL2862, $6.95 respectively). The leads on these cathodes form a circuit loop from each end of the tube, so one side needs to be retained along the length of the glass cylinder. This was achieved using clear heat shrink, and the wires were cut and soldered to a common length. The cathodes and wiring were then glued into place using a hot glue gun. As the inset shows, with the body in place there is quite a wash of light flowing out from under the car – however this was an always-on situation. You might want to add a miniature toggle switch (Jaycar Cat# ST0355, $2.90) into the circuit, and mount it underneath the chassis.



9 With the drives loaded and the cables plugged in and zip-tied in place, the chassis was ready to go. One question that has been asked is: Do the headlights also flash with disk access? The answer is no! Although this would be a simple addition to the project, using a pair of 3mm LEDs in parallel, utilising the existing wiring, our decision was to not go overboard with the bling and to keep the car looking as much like a model as possible. As mentioned, care was taken to make sure that the cabling path was kept as smooth as possible. Sorry about the green USB lead!

10 The original project concept was to make use of a network drive that would accept an additional USB drive being connected, allowing for a fast RAID or JBOD enclosure that would add 500GB of network space. Sadly, the enclosures that we received weren't compatible.

What we now have is a 250GB network drive and a 250GB USB external drive in the one, unique enclosure, which nevertheless makes it a useful solution for external file storage. And it still looks like a car!

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INPUTOUTPUT

Fixing stuff no one else can, including God and your mum

Warewolf Dan

Yes, **Dan Rutter** wishes to feast on the meat of your tech troubles. Satiate him at **io@atomicmpc.com.au**.

The Easy-Bake PC

I My slightly antique 3.4GHz P4 hit 100 degrees celsius today. It tends to run extraordinarily hot all the time, often hitting 80-84°C under load.

The exact model of CPU is an Intel P4P-EM64T (Prescott) Pentium 4E 90nm. I had the same problem for months with the 3GHz version of the same CPU, and having tried everything else I replaced the CPU a few days ago with the one mentioned above, but still the heat problem exists.

Here's what I've done so far to try to remedy the problem:

1. Installed a better cooler. I ended up with a 120mm Zalman copper cooler, huge!
2. Replaced the power supply – I had indications the rails were not running at the voltages they were meant to and thought this may have fixed the problem
3. Applied thermal paste – then removed it when it didn't help
4. Underclocked my CPU down from 3GHz to 2.1GHz. This meant it topped out at 74°C, still far too hot from what I know.
5. Bought a new CPU.

Am I missing something? Could it be the thermometer in the motherboard that's dodgy?

What would you next steps be, aside from canning the whole computer and starting again from scratch?

Mark Moor

O 100°C is about 30 degrees over that P4's official maximum operating temperature – see **tinyurl.com/6EMWL**. The 'maximum case temperature' listed there is the temperature of the sensor in the middle of the CPU's heat spreader, not the temperature of the air inside the computer's case.

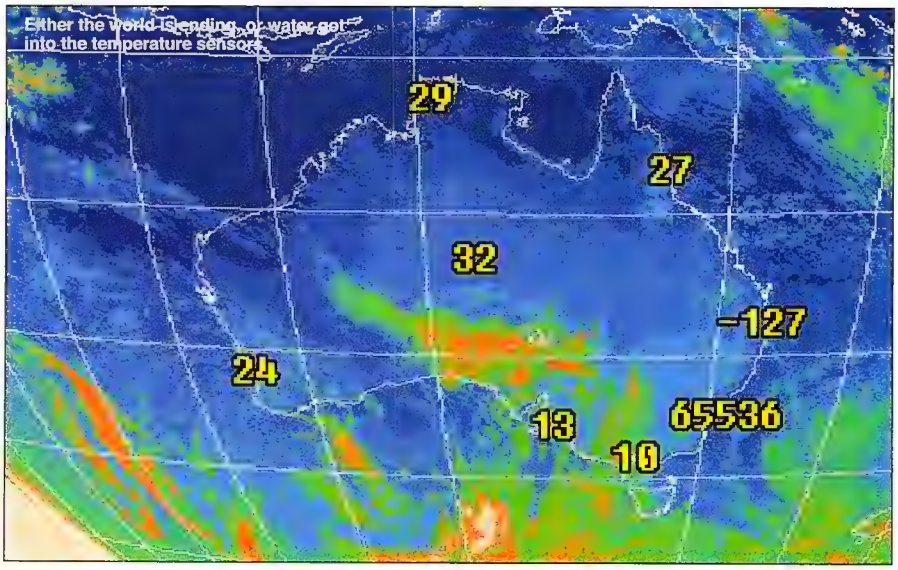
Some current CPUs can keep running at that temperature, but any P4 ought to crash hard if it gets that hot.

So you actually just have a CPU that's misreporting its temperature, or a motherboard that's misinterpreting the temperature the CPU reports. As you've seen the same symptoms with two CPUs, I'd bet on the mobo being the culprit.

If the computer doesn't crash all the time, then the CPU is not actually too hot and you have no problem to solve.

You mention, though, that you applied thermal paste and then removed it again. That's bad. There should be a thin smear of paste on the top of the CPU, just to fill the tiny air voids between the metal of the CPU's heat spreader and the bottom of the CPU cooler.

In reality, lots of people put a big old toothpaste-commercial blob of grease between their CPU and the heat sink, which works well enough. It's really not that critical if you're not going for absolutely optimal performance. But there still ought to be some grease in there. A dry joint between the CPU and heat sink could well give you a *genuinely* overheating CPU in the future.



I/O OTM wins a Logitech G5!

There's a mouse in the house. Okay, it's not in the house, it's in IO. And it looks damn good.

Impact wrenches, not so much

I Can you use magnetic-tip screwdrivers in (relatively modern) computers without risking damage to components?

I've seen warnings with regard to possible corruption of PROM chips, and I suppose the magnetic tip could induce small currents in devices in ideal conditions. But I've also seen people warning about damage to floppy and hard disks (the latter seems unlikely), which makes me wonder if this is still relevant to modern computers. I've seen these screwdrivers used by PC repair shops, and haven't heard of a computer being destroyed.

Jeffrey

O Yes, they're safe. You probably couldn't even damage data on a floppy disk with most magnetic drivers.

An actual PROM is a write-once device that can't be erased by *any* means, though you could corrupt the data on one by applying the same voltage to the programming pins that was used

Magnets in your PC: Generally OK. Magnets plus ferrofluid: Asking for trouble.

to program it in the first place. That'll be at least 12 volts, which you're not going to generate by waving a magnet around over the board.

EPROMs can only be erased by UV light, so they're safe too.

EEPROMs are another relatively high-voltage device, so magnetically induced voltages aren't likely to be anywhere near enough to corrupt them, either.

I'm sure you've all wondered

I want to add a smoke machine to my case, but most smoke machines use an additive in water right? Is there any smoke machine that I can safely put in my computer and not kill it?

Grant

There are two basic kinds of modern theatrical fog machine (as distinct from dry ice, which gives you a great low-lying spooky fog, but isn't really a switchable effect).

Smaller smoke machines use, as you say, a water-based fluid, usually with glycol in it to make the actual smoke. I think it's almost always triethylene glycol, which is a low-toxicity substance. Ethylene and diethylene glycol will work too, but both of them are pretty poisonous; they're the glycols that kill you if you drink antifreeze.

It's pretty much impossible to poison yourself with triethylene glycol smoke. Some people feel sick when they breathe it for a while (especially if it's the 'flavoured' variety that some fool invented), but most people are fine in even ludicrously thick glycol smoke.

The smoke as it comes out of the machine is mainly hot steam; it's obviously not a good substance to spray on electronics. The smoke will also leave a thin layer of condensed glycol on surfaces, and the glycol is hygroscopic – it attracts water. So over time there could be a corrosion risk there, too. Just filling a room with glycol smoke a few times won't do computers in that room any harm, though – well, not based on my experience, anyway.

The other kind of fog machine, sometimes called an 'oil cracker', is basically just an atomiser, like a perfume sprayer only more so. It blasts light mineral oil into ultra-fine droplets. Oil fog is not very healthy to breathe – mineral oil isn't particularly toxic, but hydrocarbons in the lungs are generally inadvisable. It's completely fine for electronics, though, and will never hurt anything unless you manage to fog up the lens in your optical drive with it, or something.

Unfortunately, oil crackers tend to be big heavy loud machines that're made for fogging very large areas. I don't know how easy it would be to make a small one.

It's quite easy, in contrast, to make a tiny glycol fogger. All you have to do is boil the smoke fluid somehow, and you get smoke. The Zero Blaster smoke ring gun has a little tiny glycol fogger in it that runs from AA batteries.

If I were going to put a smoke machine in a PC, I'd make it a glycol fogger. It wouldn't be hard to make one that'd run from the 12V rail of the PSU, with a bit of nichrome resistance wire and hardware-store parts. If you left it running for ages, though, you'd probably end up with corrosion problems in the PC, plus more subtle problems like a flat CMOS backup battery (because moisture would bridge the terminals of the battery).

There's more than one kind of smoke test.

I/O OF THE MONTH

Also unsuitable: liquid bromine, liquid lead

Being the clock enthusiast I am, I've pondered the use of liquids that have a lower boiling point than what you'll find in most extreme tech overclocking articles, which is liquid nitrogen (LN2).

How about LHe, though? Can't anyone cool helium close to boiling point and use that as the cryogenic cooling liquid?

Wouldn't that make for a better and cooler (pun not intended) liquefied gas for CPU cooling experiments?

Godbox

It's too expensive, and it wouldn't work. Nitrogen is 78% of the atmosphere, so all you have to do to get impure liquid nitrogen is compress and super-chill air. If you want pure liquid nitrogen, you fractionally distil liquid air – like making whiskey, only colder – and can thus make the stuff in vast quantities at relatively low cost.

Helium, in contrast, only makes up about five parts per million (by volume) of air. It's the second most abundant element in the universe in general, but it doesn't hang around near (or under) the ground on planets if it has any choice at all, so we have to go looking for it.

We get helium from fossil fuel deposits, where it's found in significant percentages mixed with methane and nitrogen.

Once you have your helium, liquefying it is the second problem. At sea level, nitrogen boils at 77 kelvin, 196 degrees below-zero celsius. Cold, but not so cold as to be ludicrously difficult to make or transport.

Liquid helium is used as coolant only in applications where absolutely nothing else will do, like the superconducting magnets in MRI machines, which won't work at mere liquid nitrogen temperatures. That's because helium has a sea-level boiling point of only 4.2 kelvin – four-point-two Celsius degrees above absolute zero.

It is really, really hard to chill things down to 4.2 kelvin. You need exotic hardware and *enormous* amounts of power per unit of produced liquid.

Storage and transport are a nightmare, too. Liquid gas tankers allow some of the gas to boil off to allow the rest to stay liquid (and prevent the tank from exploding...), but liquid helium boils off so fast even when surrounded by tons of insulation that you pretty much have to make it (from compressed helium) where you use it, not have it delivered in a liquid state.

And then, after going to all of this trouble, you'd probably find that your amazing super-overclocked system didn't bloody work anyway. The quantum weirdness that allows semiconductors to work also means that they're likely to stop working again below about 100 kelvin (which, yes, means that liquid nitrogen rigs should be turned on before you start pouring the liquid in).

And, more prosaically, liquid helium would be likely to freeze components around the CPU that are better left unfrozen. You shouldn't, for instance, expect electrolytic capacitors that've explored the lower ranges of the kelvin scale to work afterwards.

ATOMIC HOTBOX

The best reader-submitted custom made boxes every month.

Welcome to Hotbox! Gaze on the best case mods Australia and NZ have to offer! If you think you box is up to scratch, submit it to **hotbox@atomicmpc.com.au.**

hotbox OF THE MONTH

Shak's Fanatic

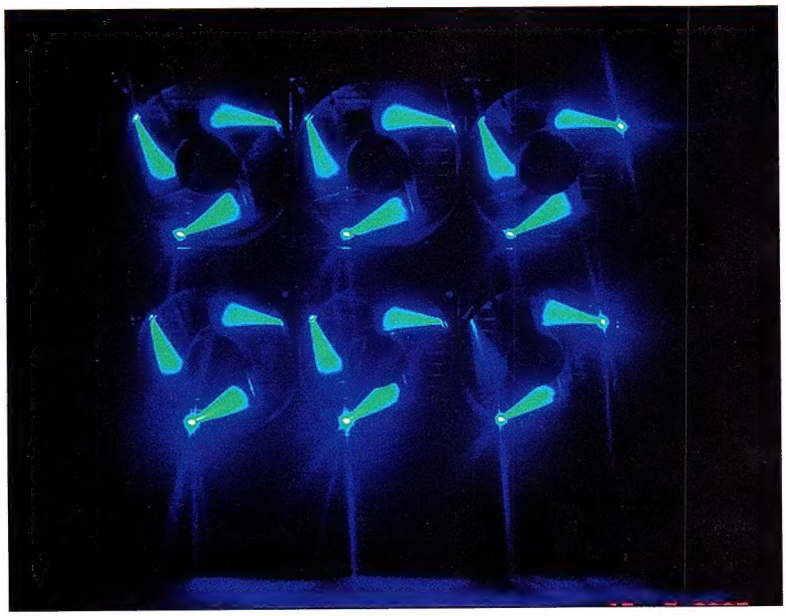
It all started when I wanted a case that could fit two 360 radiators internally, but then came to the conclusion that there wasn't a case that could hold both radiators. So one evening I decided to build one.

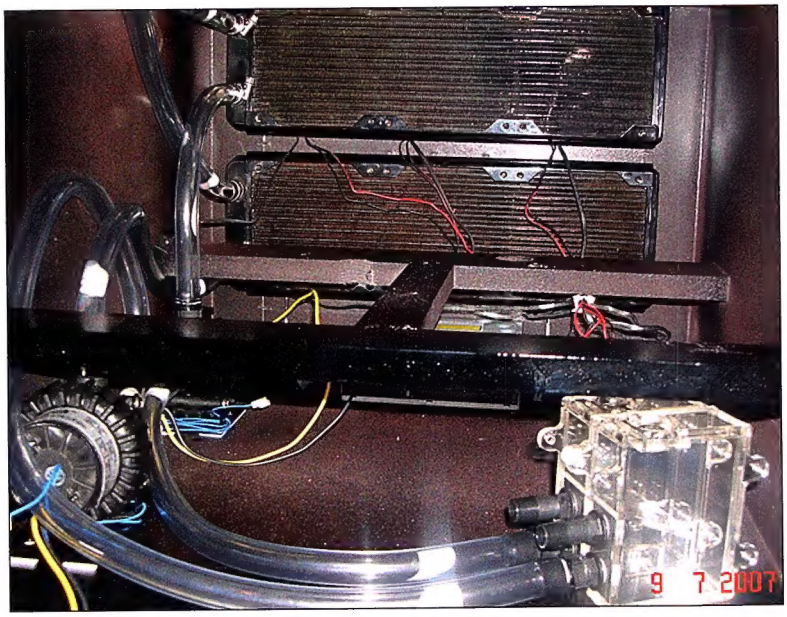
A mate of mine had the right tools in his shed. So the journey was underway, and I wanted something cube-like that would hold my motherboard flat and not upright. I came up with the inner box, which would house the motherboard and the outer case that would hold everything else.

The inner box has mounts for the motherboard and four holes along the right side for tubing to come through. On the bottom of the box are holes that the wiring would come through to the motherboard, all hidden away from the eye. I like the neat look. The inner box is supported by two pieces of wood across the bottom that I then screwed in.

Fame, fortune and free stuff can be yours! Send your Hotbox to hotbox@atomicmpc.com.au and make sure you include the following details so you can be eligible:

- Six to 12 high res, well-lit, pics of the inside and outside of your case
- A 500-word description of how you made it, the obstacles you overcame, the tools you used, and your inspiration
- A detailed list of the machine's specs. Include CPU, video card and RAM





With the inner box done, we started the outer case. It was straightforward, all it need was a cube with open back slots for the radiators and a CD-ROM, and the lid with an opening for perspex. Once all glued and nailed together it was time to take it to the local panel shop to have it oven-baked, the result I think was outstanding.

As for airflow, the three bottom fans push air underneath the inner box to cool down the hard drives that are located in a HDD cage sitting on the floor of the box, and to the PSU next to it. The top three fans push air over the inner box, as the inner box doesn't completely go to the lid – there is about a one-inch gap. Air then reflects off the lid and perspex, and into the inner box for some airflow with a single 120mm fan pulling any trapped air out.

As for the power and reset buttons, they are located at the back of the case out of view. To give it a nice glow at night there is a neon blue light located under the lid.

technicaldetails

CPU
Intel Core 2 X6800 @ 3.8GHz

MOTHERBOARD
EVGA 680i

VIDEO
XFX 8800 GTX @ 690GHz

RAM
Corsair Dominator 8500C5

EXTRAS
Thermaltake 850W PSU
Water-cooling setup: dual-loop, 1st loop for CPU only; 2nd loop is GPU/SB/NB.
Swiftech Apogee GTX
Swiftech Stealth GPU block
2x Swiftech MCW30 chipset blocks
2x Swiftech MCP655-B pumps
2x Swiftech MCRES Hi-Flow reservoirs
2x Hardware Labs Black Ice GT Stealth 360
7x Antec 3-speed fans
Swiftech 7/16" tubing

Hotbox of the month wins a
GIGABYTE GA-P35-DS3P!

- Intel Core 2 Extreme/ Core 2 Duo/Pentium D
- 8-channel Dolby & DTS
- Silent Pipe cooling design
- Dual PCIe for CrossFire

GIGABYTE™ TECHNOLOGY

Supports intel Core 2 Duo inside

FALLOUT

Funnies and humour from the fallout zone

Smoked kippers

Logan Booker will be back for breakfast.

If you were to ask someone on the street if they knew Felix Montague, their answer would most likely be 'No'. Which was a good thing, because Felix was an undercover cop. Undercover cops tend to find themselves in a spot of bother when people know their identities. Even a single mistake can transform said spot of bother into a molten metal pool in a remote steel foundry.

Felix did not particularly enjoy the idea of being melted down into his component atoms, and so pretty much kept his true identity under his hat. When he wasn't wearing a hat, he just didn't bring it up in conversation, which proved oddly effective.

At the moment, Felix was seated in an elegant dining room at the city's premiere hotel.

'Did you see the trout? Portobello mushrooms? The chef must be off his nut!' remarked the elderly woman beside him. The two shared a laugh before the she turned back to examine the rest of the menu.

Felix, however, could not indulge in such a luxury. No, his attention was drawn to something far more important.

Sitting at the far end of the exquisitely ornate table was Samuel Dakish, the city's most prominent mob boss. Tonight was the night Felix would expose Dakish and his illegal activities.

Drug running. Prostitution. Parking in clearways. This guy'd done it all.

Gathered around the table was a selection of the city's officials, including the mayor and the chief of police. They were completely unaware of Dakish's guilt.

Oh yes, thought Felix, this dog will have his day.

As the general pre-order chatter drew to a close, Felix saw his moment. He stood up as dramatically as his pants would allow.

'Samuel Dakish, I'm placing you under arrest. I have a file as long as this table back at the office filled with your reprehensible acts.'

'As long as this table? I find that a bit hard to believe.' It was the elderly lady he'd spoken to earlier.

'Huh? It's an expression. It's not really as long as this table.'

'Well, how long is it then?'

Felix faltered. 'Well, it's pretty chunky, like a Dan Brown novel.'

'Which one?'

'Which what?'

'Which Dan Brown novel? *The Da Vinci Code*?'

'Yeah, that'll do,' Felix replied. 'Now, Drakish, you're charged with-'

'You do know that most of the information in that book is inaccurate. Missing important facts, that sort of thing?'

'Why does that matter?'

'What happens if your file's the same?'

Felix was stunned into inaction. Any minute now he was expecting this old woman to rip her face off *Mission Impossible*-style and declare herself as Keyser Soze.

'Trust me, it's all true. I've done the groundwork.'

'And you expect us to take your word for it? That's asking a bit much, isn't it?'

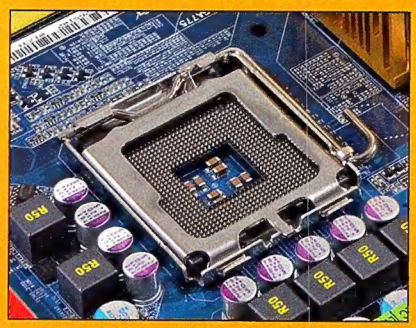
Everyone at the table nodded, murmuring agreement. Drakish was, unsurprisingly, the most animated in this respect.

Felix could feel the police chief's eyes burning a hole in his pension. This wasn't how it was supposed to go! He didn't look like Tom Selleck, and he certain didn't feel like him.

Frustration beat down the doors of his patience.

'Look, I'm taking him in and there's nothing you can do about it!' With this statement unleashed, Felix drew his gun from his shoulder holster...

NEXT MONTH



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